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# CATALOGUE

OF

# MARINE POLYZOA

IN

## THE COLLECTION

OF THE 33187

## BRITISH MUSEUM

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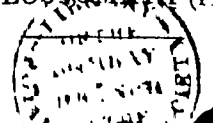
PART I.

CHEILOSTOMATA (PART).



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# NOTICE.

In the present Catalogue it is intended to comprise figures and descriptions of all the species of Marine Polyzoa in the Collection of the British Museum,—and from typical specimens therein contained.

This Collection, already valuable, especially in the possession of Dr. Johnston's specimens, has recently been materially augmented by the addition of numerous Australian and other forms, many of them new, procured by Mr. J. M'Gillivray, on the Voyage of H.M.S. Rattlesnake. It has also been much enriched by the liberality of Charles Darwin, Esq., F.R.S., Dr. J. Hooker, F.R.S., Dr. Lyall, R. M'Andrew, Esq., F.R.S., J. S. Bowerbank, Esq., F.R.S., the late W. Thompson, Esq., of Belfast, and others, who have placed their Collections at Mr. Busk's disposal, for the purposes of this Catalogue, and for the selection of the specimens required for the Museum Collection.

The Catalogue has been prepared, and the drawings made, by Mr. George Busk, F.R.S., who has also super-

intended the execution of the lithography. The magnified figures have in all cases been taken from nature, and for the most part from specimens preserved in fluid, in order to ensure a more natural aspect than that afforded by dried specimens. As they have been drawn with the aid of the camera lucida, and to a scale which is given with each plate or figure, the absolute and relative proportions of the different objects will be at once obvious.

The other Parts will appear as soon as they can be prepared.

JOHN EDWARD GRAY.

*British Museum,*
*August* 1, 1852.

# LIST OF SPECIES.


| | | | Page |
|---|---|---|---|
| Class POLYZOA | | | 1 |
| Order I. P. INFUNDIBULATA | | | 1 |
| Suborder I. CHEILOSTOMATA | | | 2 |
| § 1. Articulata | | | 2 |
| §§ 1. Uniserialaria | | | 2 |
| Family 1. CATENICELLIDÆ | | | 2 |
| Gen. 1. Catenicella | | | 3 |
| α. Fenestratæ. | 1. C. lorica | | 6 |
| | 2. C. ventricosa | | 7 |
| | 3. C. hastata | | 7 |
| | 4. C. aurita | | 8 |
| | 5. C. amphora | | 8 |
| | 6. C. plagiostoma | | 8 |
| | 7. C. cribraria | | 9 |
| | 8. C. margaritacea | | 9 |
| β. Vittatæ. | 9. C. formosa | | 9 |
| | 10. C. perforata | | 10 |
| | 11. C. ringens | | 10 |
| | 12. C. elegans | | 10 |
| | 13. C. cornuta | | 11 |
| | 14. C. umbonata | | 11 |
| | 15. C. gibbosa | | 12 |
| | 16. C. taurina | | 12 |
| γ. Simplices. | 17. C. carinata | | 12 |
| Gen. 2. Alysidium | | | 14 |
| | 1. A. parasiticum | | 14 |
| | 2. A. lafontii | | 14 |

Page

Gen. 3. Calpidium ..... 14
1. C. ornatum ..... 15

§§ 2. Bi-multiserialaria ..... 15

Fam. 2. SALICORNARIADÆ ..... 15

Gen. 1. Salicornaria ..... 16
1. S. farciminoides ..... 16
2. S. gracilis ..... 17
3. S. tenuirostris ..... 17
4. S. malvinensis ..... 18

Gen. 2. Nellia ..... 18
1. N. oculata ..... 18
2. N. simplex ..... 19

Fam. 3. CELLULARIADÆ ..... 19

Gen. 1. Cellularia ..... 19
1. C. cuspidata ..... 19
2. C. peachii ..... 20
3. C. ornata ..... 20

Gen. 2. Menipea ..... 20
1. M. fuegensis ..... 21
2. M. ternata ..... 21
3. M. cirrata ..... 21
4. M. triseriata ..... 22
5. M. multiseriata ..... 22
6. M. patagonica ..... 22

Gen. 3. Scrupocellaria ..... 23
1. S. cervicornis ..... 24
2. S. diadema ..... 24
3. S. scrupea ..... 24
4. S. macandrei ..... 24
5. S. cyclostoma ..... 24
6. S. ferox ..... 25
7. S. scruposa ..... 25

Gen. 4. Canda ..... 26
1. C. arachnoides ..... 26
2. C. reptans ..... 26

Gen. 5. Emma ..... 27
1. E. crystallina ..... 28
2. E. tricellata ..... 28

Page

§ 2. Inarticulata seu continua ..... 28

§§ 1. Uniserialaria..... 28

Fam. 4. SCRUPARIADÆ ..... 28

Gen. 1. Scruparia ..... 28
1. S. chelata..... 29

Gen. 2. Hippothoa ..... 29
1. H. catenularia ..... 29
2. H. divaricata ..... 30
3. H. patagonica..... 30

Gen. 3. Ætea..... 30
1. Æ. anguina ..... 31
2. Æ. dilatata ..... 31
3. Æ. ligulata ..... 31
4. Æ. truncata... ..... 31

Gen. 4. Beania ..... 32
1. B. mirabilis ..... 32
2. B. australis ..... 32

Fam. 5. FARCIMINARIADÆ ..... 32

Gen. 1. Farciminaria..... 32
1. F. aculeata ..... 33

Fam. 6. GEMELLARIADÆ... ..... 33

Gen. 1. Gemellaria ..... 34
1. G. loricata ..... 34

Gen. 2. Didymia ..... 35
1. D. simplex ..... 35

Gen. 3. Dimetopia ..... 35
1. D. spicata..... 35
2. D. cornuta ..... 35

Gen. 4. Notamia ..... 36
1. N. bursaria ..... 36

Fam. 7. CABEREADÆ ..... 37

Gen. 1. Caberea..... 37
1. C. rudis ..... 38
2. C. boryi ..... 38
3. C. hookeri ..... 39
4. C. lata ..... 39

Page

Gen. 2. Amastigia ..... 40
1. A. nuda ..... 40

Fam. 8. BICELLARIADÆ ..... 41

Gen. 1. Bicellaria ..... 41
1. B. ciliata ..... 41
2. B. gracilis ..... 42
3. B. grandis ..... 42
4. B. tuba ..... 42

Gen. 2. Halophila ..... 43
1. H. johnstoniæ ..... 43

Gen. 3. Bugula ..... 43
1. B. neritina ..... 43
2. B. flabellata ..... 44
3. B. avicularia ..... 45
4. B. plumosa ..... 45
5. B. dentata ..... 46
6. B. murrayana ..... 46

Fam. 9. FLUSTRADÆ ..... 46

Gen. 1. Flustra ..... 47
1. F. foliacea ..... 47
2. F. papyracea ..... 48
3. F. truncata ..... 48
4. F. octodon ..... 49
5. F. denticulata ..... 49

Gen. 2. Carbasea ..... 50
1. C. papyrea ..... 50
2. C. pisciformis ..... 50
3. C. armata ..... 50
4. C. cribriformis ..... 51
5. C. dissimilis ..... 51
6. C. episcopalis ..... 52
7. C. bombycina ..... 52
8. C. ovoidea ..... 52
9. C. elegans ..... 53
10. C. indivisa ..... 53

Gen. 3. Diachoris ..... 53
1. D. crotali ..... 54
2. D. magellanica ..... 54
3. D. inermis ..... 54

# CATALOGUE

OF

# MARINE POLYZOA.

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## Class POLYZOA.

Polyzoa, *J. V. Thompson, Zool. Research. Mem.* v. 92 (1830); *J. E. Gray, Syn. Brit. Mus.* 133; *Johnst. Hist. Brit. Zooph.* ed. 2. 253.

Bryozoa, *Ehrenberg, Symbolæ Physicæ* (1831); *Corall. des Roth. Meer.* 153; *Jones, Anim. Kingd.* 107, 117; *Owen, Lect.* 93. 101.

Molluscan Zoophytes s. Zoophyta Ascidioida, *Johnst. Mag. Zool. & Bot.* i. 448; *Couch, Corn. Faun.* iii. 84.

Les Bryozoaires, *Audouin and Milne-Edwards, Lam. Anim. s. Vert.* ed. 2. ii. 104.

Ciliobrachiata, *Farre, Phil. Trans.* 1837.

Polypes tuniciens, *M. Edwards, Mem.* 16.

Polypiaria (pars), *Blainv. Dict. Sci. Nat.* 1830, lx. 364.

## Order I. POLYZOA INFUNDIBULATA.

Polypiaria infundibulata, *P. Gervais, Ann. d. Sc. Nat.* (1837) vii. 79.

## Suborder I. CHEILOSTOMATA.

Aperture of the cell filled with a thin membranaceous or calcareous velum, with a crescentic mouth provided with a moveable lip.

Escharadæ, Flustradæ, Cellariadæ (ex Crisia), *Fleming, Brit. Anim.* 1828.
Polypiaria operculifera et cellariæa (ex Crisia), *Blainville*, 1834.
Escharina, Celleporina, *Ehrenb.* 1834.
Cheilostomata, *Busk, in Voy. of Rattlesn.* i. 346, 1852.

*Synopsis of Families.*

Suborder I. CHEILOSTOMATA.

A. Articulata.

a. *Uniserialaria.*

Fam. 1. Catenicellidæ, p. 3.

b. *Bi-multiserialaria.*

Fam. 2. Salicornariadæ, p. 15.
Fam. 3. Cellulariadæ, p. 19.

B. Inarticulata seu continua.

a. *Uniserialaria.*

Fam. 4. Scrupariadæ, p. 28.

b. *Bi-multiserialaria.*

Fam. 5. Farciminariadæ, p. 32.
Fam. 6. Gemellariadæ, p. 33.
Fam. 7. Cabereadæ, p. 37.
Fam. 8. Bicellariadæ, p. 41.
Fam. 9. Flustradæ, p. 46.
Fam. 10. Membraniporidæ.
Fam. 11. Celleporidæ.
Fam. 12. Escharadæ.
Fam. 13. Vinculariadæ.
Fam. 14. Selenariadæ.

§ 1. ARTICULATA. *Polyzoary divided into distinct portions or joints by flexible articulations.*

§§ 1. UNISERIALARIA. *Cells disposed in a single series.*

## Fam. 1. CATENICELLIDÆ.

Cells connected by flexible joints.

Catenicellidæ, *Busk, Voy. of Rattlesn.* i. 352.

*Synopsis of Genera.*

1. Catenicella.
2. Alysidium.
3. Calpidium.

### 1. CATENICELLA.

Cells arising one from the upper and back part of another by a short corneous tube, all facing the same way, and forming dichotomously divided branches, of an erect phytoid polyzoary; cell at each bifurcation geminate; each cell with two lateral processes usually supporting an avicularium. Ovicells either subglobose and terminal, or galeriform, and placed below the opening of a cell in front.

Catenicella, p., *Blainville, Man. d'Act.*
Catenaria, *Savigny, Egypt.* pl. 13.

It is much to be regretted that no observations have hitherto been made upon the living animal in this genus, which might almost be regarded as the type of the suborder to which it belongs; and it is to be hoped that future observers, in the Australian seas, will make the various species of *Catenicella* the subject of assiduous study. Considerable light will thence be derived as to the nature and relations of the Polyzoa, thus studied in their simplest, but at the same time perhaps most perfect form.

The genus may be regarded as characteristic of the Australian seas; for although it occurs elsewhere in the southern hemisphere, it does so but rarely, and it is almost unknown in the northern hemisphere. Of the seventeen species enumerated below, thirteen were collected on the coasts of Australia and New Guinea, on the voyage of H.M.S. Rattlesnake. Several of these, and some other species which do not occur in the Rattlesnake collection, are found in New Zealand and Campbell's Island. Two or three other species, one at least common to Australia, occur in South Africa.

A species, undoubtedly referrible to this genus, is figured by Savigny (Egypt, pl. 13. fig. 1) under the name of *Catenaria*, and described by Audouin under that of *Eucratea contei*. The characters, however, given of this species, either in the figure or description, are insufficient for its exact determination among such a number of forms, greatly resembling each other in general aspect: and although the *Cellaria catenulata* of Lamarck (An.

s. Vert. t. ii. p. 180) is equally an indisputable member of the same genus, its identification, from the description there given, with any of the species here enumerated, does not appear to be possible. There seems little reason for referring his *Cell. vesiculosa* to the genus at all, as in that species, it is said, the articulations appear to be formed of two cells united. The *Menipea hyalæa* of Lamouroux (Polyp. Flex. p. 146. pl. 3. fig. 1), though in the figure exhibiting some faint traces of the aspect of a *Catenicella*, cannot safely be referred to that genus; neither, most probably, can *Eucratea cordierii*, Audouin (Savigny, Egypt, p. 13. fig. 3), which latter would seem to form the type of an as yet undescribed genus. In *Catenicella* each cell arises from the upper and back part of another by a short corneous tube, which is prolonged from the interior of one cell to that of the one above. The cell is furnished on each side at the top with a usually well-developed avicularium, in some species of huge size, and in some very minute or entirely aborted. This avicularian process, which is sometimes closed above and more or less elongated upwards, constituting a conical or acerose spine, is sometimes open above, assuming the form of a shallow cup or receptacle. In some species both modifications of this portion of the lateral process are met with in the same specimen. This form of spine or cup, as the case may be, is always distinctly separated from the cavity of the avicularium itself by a calcareous septum. Below the avicularium there is also in many cases a third distinct cavity, usually widely open, the opening being occasionally covered in by a convex transparent membrane, and its bottom apparently perforated by several minute foramina. It is thus correct to say, that each cell is furnished with two lateral processes, each of which, in the fully developed state, consists of three distinct compartments,—one superior, a cup or spine; a middle one, which is the avicularium; and an inferior. And it would appear that one or more of these elementary compartments of the lateral process may be more developed than the next, or sometimes more or less completely aborted. The mouth of the cell is situated at the upper part, and is of the same conformation as in the rest of the Cheilostomatous suborder. An important generic character consists in the gemination of the cell at each bifurcation.

These characters are common to all the species included in the genus, which furthermore admits of being subdivided into three extremely natural sections or subgenera. These subdivisions are named respectively the "Fenestratæ," the "Vittatæ," and the "Simplices." In the fenestrate division the cells are of larger size and stronger than in the others, and the wall of the cell appears to be constituted of at least two distinct laminæ. The external lamina on the front of the cell is perforated by a certain

number of holes, or rather is wanting in a certain number of spaces, for which spaces the term "fenestræ" is here employed. These apparent openings, therefore, do not penetrate into the cavity of the cell. But besides the fenestræ, there is in some cases a small central opening which does penetrate through the wall. In most cases the fenestræ are arranged in a crescentic, or rather horse-shoe-shaped line, indicative as it were of the limits of a regular oval space in the front wall of the cell, the upper part of which oval would be formed by the mouth, and the remainder filled up by the deposition of calcareous matter, as happens in the older cells of many other of the *Cheilostomata*.

A further characteristic of the fenestrate *Catenicellæ* is the terminal position of the ovicells. These organs are clearly transformed cells, or cells dilated to considerably more than their natural bulk, and assuming a subglobose form; and, what is worthy of remark, these terminal ovicells always have a sessile avicularium on the summit.

In the "Vittatæ" the cell is smaller, and usually more delicate and transparent. They probably want the outer lamina, or have it very thin, and consequently present no fenestrate spaces, and the front of the cell is beset (sometimes very sparingly) with more or less prominent, minute, acuminate "papillæ." On each side, sometimes on the anterior aspect, sometimes quite laterally, is a narrow elongated band, or "vitta" as it is here designated, from which the sectional appellation is derived. This band or stripe (the nature of which is unknown) varies in width and proportionate length and position in different species; it is slightly elevated, and marked with larger or smaller circular, discoid, or acuminated eminences. This subdivision is further distinguished by the situation of the ovicells, which are not terminal, but occur at irregular intervals on cells in the course of the series. They are of the ordinary galeate form, but are not apparently placed above the mouth of a cell, as is most usual in the Cheilostomata, but below it in front. In all cases the shape of the ovicelligerous cell is very different from the rest, and in all the vittate species it arises from its predecessor, without the intervention of a short tube, but is immediately sessile upon it by a broad base. This conformation is well seen in *C. gibbosa* (Pl. VII. figs. 3, 4). It is not improbable, however, that the inferior position of the ovicell is more apparent than real, and that in fact the ovicell, which appears to be inferior in the upper of the two cells, really belongs to the one below, and is merely, as it were, immersed in the base of the upper one. In one instance, *C. taurina* (Pl. XI. fig. 3), the situation of the ovicell is peculiar: in this species the ovicelligerous cell is geminate, the ovicell being placed on the summit of a secondary cell, on the side of the one forming part of the series.

In the third subdivision of the *Catenicellæ*, or that here termed "Simplices," there is at present but one species. This differs so much in many respects from any of the former, that it might, perhaps, constitute the type of a distinct genus: agreeing however as it does, in essential particulars, with the rest, it has been thought better to place it, at least provisionally, with them. In this form there are neither "fenestræ" nor "vittæ," nor are there, properly speaking, any avicularia. The latter, however, are represented by two strong lateral processes, which are grooved in front, and may in the living state have a moveable member, either mandible or seta, which is wanting in the dead specimens.

*α*. Fenestratæ. *Cells fenestrate in front; ovicells terminal.*

Catenicellæ fenestratæ, *Busk, in Macgillivray's Voy. Rattlesn.* i. 352.

1. CATENICELLA LORICA. Pl. I.

Cells elongated rhomboidal, truncate at each end. Fenestræ 3, large, the lowest the largest. Avicularia large and strong; back marked with faint longitudinal striæ.

Catenicella lorica, *Busk, in Voy. of Rattlesn.* i. 358.
*Hab.* Bass' Strait, 45 fathoms.

Colour white, transparent. A fine, widely-branching species, in which the catenulate aspect is more evident to the eye than in almost any other. It is at once recognizable by the rhomboidal, scutate form of the cell, viewed anteriorly; and when the back is also viewed, the resemblance of the two aspects to the back, and breast-plates of a coat of mail, is very striking. The structure of the lateral processes is more distinctly to be made out in this species than in any other. Each lateral process consists,—1. of a deep cup-like cavity above; 2. a middle compartment—the *avicularium*; and 3. a third loculament below the avicularium, the wide opening of which is covered in by a convex transparent membrane. The bottom of this loculament appears to be perforated; and it is to be noticed also, that there is a small central perforation in the septum separating it from the cavity of the avicularium. Towards the bottom of the cell, on each side, is a well-developed lateral area, of exactly the same conformation as the subavicularian loculament, and like it covered in by a convex transparent membrane. It might be supposed that these cavities were for the purpose of containing air, in order to render the otherwise heavy branches of the polyzoary buoyant. They at all events appear to be perfectly empty.

2. CATENICELLA VENTRICOSA. Pl. II. figs. 1, 2; Pl. III. figs. 1, 2, 3, 4, 5.

Cells oval, compressed. Avicularia wide, supporting sometimes a cuplike cavity, sometimes a closed, broad, conical spine. Fenestræ 7, with fissures radiating towards a rounded central pore. Front of cell studded with minute acuminate papillæ; back smooth, sometimes spotted.

Catenicella ventricosa, *Busk, in Voy. of Rattlesn.* i. 357. t. 1. fig. 1.
*Hab.* Bass' Strait, 45 fathoms.

Colour dirty white or brown; habit stiff; stem strong, straight; branches short and crowded; probably attains a height of 4 or 5 inches. The only other species with which it can be confounded is *C. amphora*, from which it differs in the greater size and more irregular form of the lateral processes; in the presence of the minute papillæ on the surface; and in the absence of the narrow longitudinal band on the back; instead of which, the older cells in *C. ventricosa* exhibit a sort of broad scutum, almost covering the back of the cell, and sending off two lateral bands on the sides of the cell, one passing below the avicularium and above the lateral area, and the other towards the acuminated apex of the avicularium. It also wants the raised bands which in *C. amphora* pass from the sides of the mouth to the apex of the avicularium in front. One large specimen presents a variety worthy of note: in this the backs of all the cells, except one here and there, exhibit (internally?) numerous irregular-sized leopard-like spots.

3. CATENICELLA HASTATA. Pl. II. figs. 3, 4.

Cells oval. Fenestræ 7–9, disposed in a crescent, with fissures radiating towards the median line. Avicularia supporting large, pyramidal, pointed, hollow processes, compressed, and perforated, before and behind, by five or six small circular pores.

Catenicella hastata, *Busk, in Voy. of Rattlesn.* i. 355.
C. bicuspis? *Gray, Dieffenbach's New Zealand*, ii. 293.
*Hab.* Bass' Strait, 45 fathoms. New Zealand.

Of a yellowish white colour, sometimes reddish. Forms fine bushy tufts, with long wavy branches, arising from a short common stem, and attaining a height of 5 or 6 inches. It appears sometimes to be parasitic upon other Polyzoa, and is then much smaller. Its peculiar characteristics are, the perforated and striated scutiform area on the front of the cell, and the perforated or apparently perforated pyramidal lateral processes above each avicularium.

4. CATENICELLA AURITA. Pl. IV. figs. 1, 2, 3.

Cells oval or subglobose. Avicularia large and strong, two blunt processes, the upper the longer, on each side of the opening in front. Fenestræ 5, around a central one.

*Hab.* New Zealand. Cook's Straits, *Lyall*; Campbell's Island, *Hooker*.

5. CATENICELLA AMPHORA. Pl. IV. figs. 4, 5.

Cells oval, sides rendered straight upwards by the wide avicularia, which are prolonged above into an acute spinous process, and support a shallow cup. Fenestræ 9, pyriform, an oval central perforation; an elevated band extending from the sides of the aperture to the upper angular processes of the avicularia; an elevated flattened band, along the middle of the back, branching off above to each avicularium.

Catenicella amphora, *Busk, Voy. of Rattlesn.* i. 356.
Cellaria catenulata ? var. B., *Lamarck, An. s. V.* ii. 180 (2nd ed.).
*Hab.* Bass' Strait, 45 fathoms.

Of a bright reddish brown colour, and in the younger cells very transparent. Forms small irregularly branched bushes, 4 to 6 inches high and wide. It is peculiar by its extremely regular vase-like form of cell, which is given by the continuation upwards of the broad avicularia in nearly a straight line, and their prolongation into a sharp angular spine, on the inner side of which is a shallow cup-like cavity, whose sides are usually more horny than calcareous. The number of fenestræ appears to be very constant.

The length of the branches before their dividing, and their straightness, together with the colour of this species, render it not improbable that it is the form intended by Lamarck (*l. c.*).

6. CATENICELLA PLAGIOSTOMA. Pl. V. figs. 1, 2.

Cells short, ovoid. Avicularia nearly as long as the cell, terminating in an acute spinous point, and supporting a deep cupped cavity above; aperture placed obliquely; front of cell divided into five large subtriangular fenestræ by four broad bands. Back of cell with a broad central band and two narrower bands branching from it on each side; surface of spaces left uncovered by the dorsal bands beset with setose spines.

Catenicella plagiostoma, *Busk, Voy. of Rattlesn.* i. 358.
*Hab.* Bass' Strait, 45 fathoms. Swan Island, Banks' Strait.

Colour brownish white; habit stiff; branches short. This species is at once recognizable by the peculiar oblique position of

the mouth, the enormously developed avicularium, usually only on one side of the cell, and by the sculpture of the cell, which appears as if it were swathed with broad tapes or bands. The wide spaces left between the bands in front clearly represent the true nature of the fenestræ of other species. It is the only species furnished with elongated setose spines.

7. CATENICELLA CRIBRARIA. Pl. V. figs. 3, 4.

Cells subglobular, compressed, more or less alate. Avicularia large, without any superior appendage, and prolonged downwards into elevated lateral alæ. Fenestræ numerous, small, round, equidistant, the circumferential being larger than the rest: a minute central crescentic pore.

Catenicella cribraria, *Busk, Voy. of Rattlesn.* i. 359.
*Hab.* Bass' Strait, *Hooker*, 45 fathoms. Cook's Strait, New Zealand, *Lyall.*

Colour brown, loosely branched, and several inches high. Distinguished readily by the cribriform aspect of the front of the cell, by the curiously formed central orifice, and by the absence of any superior appendage to the avicularium.

8. CATENICELLA MARGARITACEA. Pl. VI. figs. 1, 2, 3.

Cells oval or subglobular, much compressed. Avicularia short and broad, supporting a deep cuplike cavity. Fenestræ 5, large. Lower margin of aperture notched in the middle; back of cell minutely sulcate; sulci short, interrupted, irregular.

Catenicella margaritacea, *Busk, Voy. of Rattlesn.* i. 356.
Cellaria vesiculosa?, *Lamk. An. s. V.* ii. 190.
*Hab.* Swan Island. Banks' Strait. New Zealand, *Lyall.*

A very beautiful species, the branches resembling strings of minute pearls. The pearly lustre (in the dry state) owing without doubt to the minute sulci on the backs of the cells. These sulci are not, however, consequent upon the drying, because they are equally apparent and constant when the specimen has been immersed in fluid. The species may almost at once be distinguished by the notch in the lower margin of the mouth, and which notch represents the central suboral opening present in some other species.

*β.* Vittatæ. *Cells furnished with a narrow elongated band or "vitta" on each side. Without fenestræ. Ovicells galeriform, not terminal.*

9. CATENICELLA FORMOSA. Pl. VII. figs. 1, 2.

Cells oval. Avicularia large, flat, or cupped above. Vittæ

elliptical, sublateral. Surface in front covered with minute acuminate papillæ.

Catenicella formosa, *Busk, Voy. of Rattlesn.* i. 360.
*Hab.* Swan Island, Banks' Strait.

Colour light plumbeous. Parasitic upon *C. margaritacea*. The cells are the largest of any in the vittate division, and very regular and uniform in size and outline. The more distinctive characters are taken from the comparatively broad vittæ, and the flat or cupped upper surface of the avicularia, which are usually continued downwards into a prominent ridge or ala.

10. CATENICELLA PERFORATA. Pl. VIII. figs. 1, 2.

Cells elongated oval. Avicularian processes large, perforated at the base or by several openings. Vittæ long, wider below, lateral. Surface in front papillose.

*Hab.* New Zealand, *Hooker, Lyall, Darwin.* Tasmania, *Hooker.*

11. CATENICELLA RINGENS. Pl. VIII. figs. 3, 4.

Cells ovoid or subglobular. Avicularia usually very unequal, the larger one gaping. Vittæ, anterior, broad. Surface in front smooth.

*Hab.* New Zealand, *Dieffenbach.* Algoa Bay.

Differs from *C. elegans*, with some forms of which it might be confounded, in the absence of acuminate papillæ on the anterior surface, and in the comparatively greater size and peculiar gaping aspect of the avicularia, or not unfrequently of one of them.

12. CATENICELLA ELEGANS. Pl. IX.

Cells elongated, ovoid. Avicularia large and projecting, without any superior appendage. Vittæ narrow, sublateral. Surface in front papillose.

? Eucratea Contei, *Audouin, Expl.* i. 242; *Savig. Eg.* pl. 13. f. 1.
Catenicella Savignyi?, *Blainv. Man. d'Act.* 462. pl. 78. f. 1.
Catenicella elegans, *Busk, Voy. of Rattlesn.* i. 361. t. 1. f. 2.
*Hab.* Bass' Strait, 47 fathoms; Port Cooper, Banks' Peninsula; Algoa Bay; Port Dalrymple.

A delicate and beautiful parasitic species; the branches slender and spreading; colour white and very transparent; cells regular, and uniform in size and shape. There appears to be little or no difference between the Australian and South African species; in the latter, however, the vittæ are usually much longer extending upwards as high as the mouth.

13. CATENICELLA CORNUTA. Pl. X. figs. 1, 2, 3.

Cells oval. Avicularia in most cells wholly transformed into long pointed retrocedent spines, on one or both sides; in others into shorter spines, or unaltered. Vittæ linear, extremely narrow, lateral, and extending the whole length of the cell from the base of the avicularium. Surface in front smooth.

Catenicella cornuta, *Busk, Voy. of Rattlesn.* i. 361.
*Hab.* Bass' Strait, 45 fathoms.

Colour yellowish white; growth small; parasitic upon *C. amphora*. As some difficulty might be experienced in the discrimination of this species from *C. elegans* and another South African species (*C. taurina*), it is requisite to remark that the long retrocedent spines, when present, are not placed upon or superadded to the avicularia, but that they seem to represent an aborted or transformed state of those organs. They vary much in length and size in different cells, and even in those of the same branch, as it frequently happens that there is a spine, usually of diminutive size, on one side, and a very large avicularium on the other; sometimes (but rarely) an avicularium of more moderate size on both sides. But the character of the species by which it is more particularly distinguished, consists in the presence on a great many cells, in one part or other of the polyzoary, of the two long and strong spines projecting *backwards*.

14. CATENICELLA UMBONATA. Pl. X. figs. 4, 5.

Cells more or less pyriform, narrow below, bulging or ventricose above. Avicularia large and strong. Vittæ strap-shaped, anterior, extending from the level of the mouth to the bottom of the cell, with acuminate papillæ. A broad compressed projecting process on the middle of the back. Surface in front papillose.

Catenicella umbonata, *Busk, Voy. of Rattlesn.* i. 362.
*Hab.* Bass' Strait, 45 fathoms.

The cells in this species are small, inflated or ventricose, and, as it were, subglobular above, becoming much attenuated below; but the cavity of the cell does not appear to extend into this contracted portion, in which is contained the connecting tube, strengthened by calcareous matter, the inferior continuation of the lateral alæ, which descend from the base of the avicularium. Owing to the large size of the avicularia the upper part of the cell is much widened, and the whole acquires somewhat of a triangular form, and has a peculiar rugose aspect; derived in part also from the large size and elevation of the acuminated papillæ.

not only of the vittæ, but on the surface of the cell itself. The central umbo or crest posteriorly is a marked feature.

15. CATENICELLA GIBBOSA. Pl. VII. figs. 3, 4.

Cells pyriform, ventricose posteriorly, much attenuated downwards. Avicularia small, placed in front close to the side of the aperture, at the base of strong conical pointed processes which project in front, and are connected across the top of the cell by a prominent toothed ridge. Vittæ long, linear, entirely lateral. Surface in front with a few scattered acuminate papillæ.

Catenicella gibbosa, *Busk, Voy. of Rattlesn.* i. 360.
*Hab.* Prince of Wales Channel, Torres' Strait, 9 fathoms, mud.

Of a dark lead colour when dry. Forms an elegantly-branched bush, about 2 inches high. The gibbous form of the cells, and the peculiar anterior position of the avicularia, at the base of the projecting lateral processes, at once distinguish it from all the other vittate species. The toothed (sometimes entire) ridge extending between the two lateral processes across the top of the cell and overlapping the mouth like a penthouse, is also a very peculiar feature.

16. CATENICELLA TAURINA, n. sp. Pl. XI.

Cells oval or subglobose. Avicularia large and strong, frequently transformed into long and large ascending (not retrocedent) spines. Surface of cell smooth. Vittæ small, inconspicuous, lateral. Surface in front smooth. Ovicelligerous cells geminate.

*Hab.* Algoa Bay, &c., South Africa.

This species is at once distinguishable by the peculiarity in the conformation of the ovicelligerous cells, and the spines, which are as long as in *C. cornuta*, are not retrocedent as in that species, but ascend directly. The habit of the polyzoary is also very peculiar, growing in long branching tufts, and the smaller branchlets composed of the cells arise in pretty regular whorls around the central stems; giving to the whole somewhat of the aspect of *Thuiaria thuja*.

γ. Simplices. *Without vittæ or fenestræ.*

Catenicellæ simplices, *Busk, Voy. of Rattlesn.* i. 363.

17. CATENICELLA CARINATA. Pl. VI. figs. 4, 5, 6.

Cells oval, narrowed at each end; lateral processes (without avicularia?) projecting horizontally outwards from the side of the aperture, which is nearly central. Mouth with a small tooth on each side, and below it a triangular space with three strong coni-

cal eminences. A few scattered papillæ on the surface of the sides and back. Ovicelligerous cells geminate.

Catenicella carinata, *Busk, Voy. of Rattlesn.* i. 363.
*Hab.* Bass' Strait, 45 fathoms.

This remarkable form differs so widely in many respects from any of its congeners, as almost to deserve to be considered as the type of a distinct subgenus. The lateral processes, which may be taken to represent the perfect avicularia of the other species, are, as far as can be ascertained from specimens that have been dried, without a moveable mandible, and are probably really so because there is no corresponding beak. These processes are channelled in front nearly from the base to the extremity; they arise by a broad base on each side of the mouth and on the front of the cell, and from the conjoined bases is continued upwards and downwards, or to the top and bottom of the cell, a prominent flattened band. The expanded bases circumscribe an oval space nearly in the centre of the front of the cell, the upper two-thirds of which space are occupied by the circular mouth, on each side of which is a small calcareous tooth, to which apparently are articulated the horns of the semilunar labial cartilage. The lower third is filled up by a yellow horny? membrane, upon which are placed three conical eminences disposed in a triangular manner. The back of the cell is very convex, and has, running along the middle of it, an elevated crest or keel, acuminate in the middle. The ovicell is situated in front of the cell below the mouth, and below it are three considerable-sized areolated spots, disposed like the three conical spines in a triangle. The cells upon which the ovicells are placed, are always geminate, that is to say, have a smaller cell growing out from one side. It is not improbable that the ovicelligerous cell in fact represents two cells, to the lower one of which the ovicell properly belongs.

### 2. Alysidium.

Cells connected by short corneous tubes, of which two arise from a single cell, at each bifurcation. Avicularia single and anterior, or double and lateral, or altogether wanting?

Alysidium, *Busk, MSS.*

Closely allied to *Catenicella*; the difference in the mode in which the branches are given off, appears to afford a sufficient ground for the separation from that genus, of the forms included in the present. It must be stated, however, that there is, except in that respect, but little connection between the two species here somewhat arbitrarily made congenerous, each of which will most probably form the type of a distinct genus.

1. ALYSIDIUM PARASITICUM, n. sp. Pl. XIV. figs. 6, 7, 8, 9.

Cells oval, narrow below; a lateral process on either side above and in front, on the sides of a depressed area, in which the aperture is placed, and in which are two small perforations below the aperture. Ovicelligerous cells, arising by a corneous tube from the front of a cell.

*Hab.* Algoa Bay, Port Natal, &c.

A small delicate species, hitherto only observed parasitic upon *Carbasea armata*; but it appears to be very abundant. The ovicells are very peculiar, and would afford an excellent subject for examination in the living state.

2. ALYSIDIUM LAFONTII. Pl. XIV. figs. 1, 2, 3, 4.

Cells much elongated and tubular below. Aperture superior, margin with spines; a large avicularium in front immediately below the aperture. Front of cell with numerous perforations; ovicell superior, cucullate.

Eucratea Lafontii, *Audouin, Expl.* i. 242; *Savig. Egypt.* pl. 13. f. 2.

*Hab.* Coast of Spain, *M'Andrew.* Mediterranean? *Savig.*

This species occurs abundantly on a piece of *Eschara foliacea*, spreading across its hollows like a spider's web. In Savigny's figure it is represented as growing upon a species of Fucus. It is a very curious and remarkable form.

3. CALPIDIUM.

Cells with an avicularium on each side; with two or more, usually three, distinct apertures; arising one from the upper part of another in a linear series, all facing the same way and forming dichotomously divided branches of an erect phytoid polyzoary: cells at the bifurcation single.

Calpidium, *Busk, Voy. of Rattlesn.* i. 364.

This very peculiar genus is distinguishable from *Catenicella* in the first place, by the anomalous circumstance that each cell is furnished with two, or more usually with three, distinct keyhole-shaped mouths, and is doubtless inhabited by three distinct individuals. Whether these are separated from each other by internal partitions is unknown, but the closest examination of cells, rendered transparent by means of acid, fails to discover such. In cells thus prepared there are apparent, however, three distinct masses, reaching from the bottom of the cell to each orifice, and which are probably the remains either of the body or of the retractor muscles of the animals.

1. CALPIDIUM ORNATUM. Pl. XII., XIII.

Cells triangular-urn-shaped, compressed, very broad above; upper border straight; mouths 2–3, keyhole-shaped. Five fenestræ below each mouth; numerous branching bands on the back.

Calpidium ornatum, *Busk, Voy. of Rattlesn.* i. 364. t. 1. f. 3, 4, 5. *Hab.* Bass' Strait, 45 fathoms.

Cells large, regular, and uniform in size, resembling very closely an antique sculptured urn. Colour dark brown, and the walls so thick as to be nearly opaque. The polyzoary, which appears to attain a height of 4 or 6 inches, is bipinnate (with all the branches on one plane), the branches alternate, and given off with extreme regularity. The ultimate ramules are incurved. The central stem, or series of cells, differs in no repect as regards the size or disposition of the cells composing it, from the branches.

§§ 2. BI-MULTISERIALARIA. *Cells disposed in a double or multiple series.*

Fam. 2. SALICORNARIADÆ.

Cells disposed around an imaginary axis, forming cylindrical branches of a dichotomously divided, erect polyzoary.

Salicornariana, *Gray, Brit. Rad.* 131.

*Synopsis of Genera.*

1. Salicornaria.
2. Nellia.

The distinction between the Salicornariadæ, as here constituted, and the Farciminariadæ is at first sight not very obvious, but further examination will serve to justify their separation. In the Salicornariadæ the branches of the polyzoary constitute distinct articulations connected by flexible joints, whilst in the Farciminariadæ the polyzoary is continuous throughout. In the Salicornariadæ moreover the ovicells are deeply immersed, their situation being discernible merely by an alteration in the form of the cells by which they are borne. In the Farciminariadæ, on the other hand, the ovicell is external and of the usual cucullate form. The composition of the polyzoary in the Salicornariadæ is calcareous, in the Farciminariadæ corneous. Another family, that of the Vinculariadæ, to be afterwards described, although agreeing with the Salicornariadæ and Farciminariadæ in the disposition of the cells around a central imaginary axis, offers sufficient points of difference to justify its distinction from them.

### 1. Salicornaria.

Front of cell much depressed, surrounded by an elevated ridge, by which the surface is divided into more or less regular rhomboidal or hexagonal spaces; no aperture. Avicularia disposed irregularly.

Salicornaria, *Cuv. R. A.* 1837; *Johnst. Brit. Zooph.* ed. 2. 355.
Farcimia, *Flem. Brit. Anim.* 534; *Johnst. Brit. Zooph.* ed. 1.
Cellaria *a*, *Lamk. Syn.* 1801, 1812; *Lamx.* 1812; *Blainv.* 1830.

The distinguishing characteristic of this genus, which consists in the division of the surface of the branches into more or less regular and uniform rhomboidal or hexagonal spaces, is sufficiently obvious in all mature specimens; but as the form of spaces is in great measure dependent upon the degree of development of the cells, whose fronts the spaces represent, little dependence can be placed upon their mere form as a specific distinction. A better distinction in doubtful cases will be found in an organ which does not appear hitherto to have been noticed in this genus, viz. the avicularium, the form and position of which afford apparently an invariable character as readily discernible and sufficient, as a specific distinction, as does its presence or absence serve with other characters to distinguish *Salicornaria* from its near ally *Nellia*.

1. Salicornaria farciminoides. Pl. LXIV. figs. 1, 2, 3; Pl. LXV. (*bis*) fig. 5.

Front of cell rhomboidal, or hexangular with a straight side at top and bottom; sometimes arched above; cells in the same series contiguous. Surface granular. Avicularium distinct from, and above a cell, rostrum immersed, mandible semicircular.

Salicornaria farciminoides, *Johnst. Hist. Brit. Zooph.* ed. 2. p. 355. t. 66. figs. 6, 7; *Gray, Cat. Brit. Rad.*
Corallina fistulosa fragilis, *Raii Hist.* i. 65.
Corallina fistulosa fragilis, internodiis prælongis lævibus, albis, farciminum modo catenatis, *Pluken. Phytog.* pl. 26. fig. 2.
Bugle Coralline, *Ellis, Corall.* 46. no. 1. pl. 23. figs. *a*, A, B, C.
Eschara fistulosa, *Linn. Syst.* ed. 10. 804.
Cellularia Salicornia, *Pall. Elench.* 61.
Tubularia fistulosa, *Linn. Syst.* 1302; *Oliv. Zool. Adriat.* 267; *Berk. Syn.* i. 214.
Cellaria farciminoides, *Ellis and Soland. Zooph.* 26.
Isis Hippuris, *Fabr. Faun. Grœnl.* 427.
Cellaria Salicornia, *Lamk. Anim. s. Vert.* ii. 135, ed. 2. ii. 176; *Bosc, Vers*, iii. 129. pl. 28. fig. 6; *Lamx. Expos. Méthod.* 5; *Corall.* 55; *Bull. Soc. Phil.* iii. 185; *Blainv. Act.* 455. pl. 77. fig. 1.

Salicorniaires, *Cuv. Règ. Anim.* iii. 303.
Salicornaria dichotoma, *Schweig. Handb.* 428.
Salicornaria fistulosa, *Templeton, Mag. Nat. Hist.* ix. 469.
Farcimia fistulosa, *Flem. Brit. Anim.* 534; *Johnst. Trans. Newc. Soc.* ii. 266.
Cellaria fistulosa, *S. V. Wood, Ann. & Mag. Nat. Hist.* xiii. 17.
Farcimia Salicornia, *Johnst. Brit. Zooph.* 295. pl. 37. figs. 6, 7; *Couch, Zooph. Cornw.* 58; *Corn. Faun.* 129. pl. 20. fig. 3.

*Var. a.* Front of cell rounded, aboye.
Tubularia fistulosa, *Esper, Tubul.* t. 2. figs. 1–4.
Farcimia sinuosa, *Hassall, Ann. & Mag. Nat. Hist.* vi. 172. pl. 6. figs. 1, 2; *Macgilliv. ibid.* ix. 468.
Farcimia spathulosa, *Hassall, ibid.* xi. 112.
Salicornaria sinuosa, *Johnst. Brit. Zooph.* ed. 2. p. 356. t. 66. fig. 8; *Gray, Cat. Brit. Rad.*
*Hab.* Seas of Europe; Algoa Bay.

There can be no doubt, after examination of the typical specimens in the British Museum collection, of the identity of *S. farciminoides* and *S. sinuosa*, Hass. Figs. 1, 2. Pl. LXIV. are drawn from different parts of one and the same specimen.

2. Salicornaria gracilis. Pl. LXIII. fig. 3; Pl. LXV. (*bis*) fig. 2.

Front of cell oval or lanceolate, pointed above and below; cells in the same series distant. Surface granular. Avicularium replacing a cell; rostrum prominent, cucullate mandible broad triangular.

Cellaria tenella? *Lamk. A. s. V.* t. ii. p. 177.
Salicornaria punctata, *Busk, op. cit.* 366.
Cellaria Salicornioides? *Savigny, Egypt.* pl. 6. fig. 7.
*Hab.* Off Cumberland Island; Cape Capricorn.

Parasitic upon Sertularians and Polyzoa; branches slender, straggling, of irregular lengths.

3. Salicornaria tenuirostris. Pl. LXIII. fig. 4.

Front of cell hexagonal, with an angle at top and bottom. Cells in the same series distant, elongated or very short. Surface subgranular. Avicularium replacing a cell; rostrum prominent, pointed; mandible long, narrow, produced, acute.

Salicornaria bicornis, *Busk, op. cit.* 366.

*Var. a.* with the sides of the cell raised into a minute spinous projection at each of the upper lateral angles.
*Hab.* Bass' Strait, 45 fathoms. Tasmania, *Hooker.*

Parasitic. Branches shorter and thicker than in the preceding species. In the shape of the area they are much alike, but in *S. tenuirostris*, in some cells, and occasionally throughout the greater part of an internode, the area differs widely from the more usual form. It is much expanded and arched above. In this case there is usually a considerable-sized perforation above the mouth of the cell, as occurs not unfrequently also in *S. farciminoides*. These indicate the situation of the immersed ovicells. The avicularium affords an excellent character between these otherwise not readily distinguishable forms.

4. SALICORNARIA MALVINENSIS. Pl. LXIII. figs. 1, 2; Pl. LXV. (*bis*) fig. 1.

Front of cell arched above, very acute below. Cells distant in the same series. Surface smooth. Avicularium replacing a cell, rostrum immersed, mandible wide, large, triangular, pointed.

*Hab.* Falkland Islands, S. Patagonia, *Darwin*.

Readily distinguishable by the perfect smoothness of the surface and uniformly arched form of the area above, as well as by the form of the avicularium.

## 2. NELLIA.

Front of cell convex, with a distinct raised border; a large aperture. No avicularia. Ovicells ——?

Salicornaria, part., *Busk, Voy. of Rattlesn.* i. 367.
Nellia, *Busk, MSS.*

Although evidently closely allied to *Salicornaria*, this genus would seem to be sufficiently distinct in the form of the front of the cell and in the complete absence of avicularia. The ovicells have not been noticed, and are probably deeply immersed. In the small number of series of the cells and their conformation it approaches the next genus, *Cellularia*.

1. NELLIA OCULATA. Pl. LXIV. fig. 6; Pl. LXV (*bis*) fig. 4.

Outline of cell rounded above, not contracted downward, truncate below. Two raised hollow, perforated, papilliform processes below the aperture. Aperture elliptical. Cells quadriserial.

Salicornaria dichotoma, *Busk, op. cit.* i. 367.
*Hab.* Prince of Wales Channel, Torres' Strait, 9 fathoms.

Forms small crowded tufts from one to two or three inches high; branches very uniform in length, and thence very regularly forked or dichotomous.

2. NELLIA SIMPLEX. Pl. LXV. fig. 1; Pl. LXV. (*bis*) fig. 3.

Outline of cell rounded above, contracted downwards, truncate below. Margin much raised above. Aperture oval.

Salicornaria marginata, *Busk, op. cit.* i. 367.
*Hab.* Prince of Wales Channel, Torres' Strait.

Usually of a greenish colour; but this may be adventitious, although it is general and uniform throughout the specimen. This species differs from the above in being much larger, and in wanting the two perforations on each side above the mouth; in the less comparative size of the aperture, and in the remarkable elevation of the sharp margin surrounding the upper half of the cell. In the looser aggregation and in the form of the cells, it shows the transition from the Salicornariadæ to *Cellularia*.

## Fam. 3. CELLULARIADÆ.

Cells disposed in the same plane, forming linear branches of a dichotomously divided, phytoid, erect polyzoary.

Bugulidæ, part., *Gray, Cat. Brit. Rad. B. M.* 110. 146.
Cellularidæ, part., *Johnst. Brit. Zooph.*
Escharidæ, part., *Johnst. Brit. Zooph.* ed. 1. 248, ed. 2. 264; *Gray, Syn. Brit. Mus.* 1847, 135.

*Synopsis of Genera.*

1. Cellularia.
2. Menipea.
3. Scrupocellaria.
4. Canda.
5. Emma.

### 1. CELLULARIA.

Cells bi-triserial, more than four in each internode; oblong or rhomboidal, contiguous; perforated behind. Without avicularium or vibraculum, unless rarely the former on the upper and outer angle of the cell.

Cellularia, part., *Pallas, Elench. Zool.*; *Fleming, B. A.*
Cellularia, *Busk, MSS.*
Bugula, part., *Gray, List Brit. Rad. B. M.* 114.

1. CELLULARIA CUSPIDATA. Pl. XXVII. figs. 1, 2.

Upper and outer angle prolonged into a strong spine. A single perforation behind. A cuspidate spine on the summit of the median cell at each bifurcation. Ovicell smooth.

C. monotrypa, *Busk, Voy. of Rattlesn.* i. 368.
*Hab.* Australian Seas (ubique); New Zealand, *Hooker*; *Lyall.*

This is at once distinguished from *C. peachii* by the cuspidate point on the summit of the median cell at each bifurcation, and the smoothness of the surface of the ovicell.

2. CELLULARIA PEACHII. Pl. XXVII. figs. 3, 4, 5.

Cells subelongated, attenuated downwards, truncate and somewhat rounded above. A small spine on the upper and outer angle sometimes wanting. Three to five perforations behind. Mouth oval, regular; margin subincrassate, minutely granular. Ovicell subglobular, with a tessellated surface.

Cellularia Peachii, *Busk, Ann. Nat. Hist.* New Ser. vii. 82. pl. 8. figs. 1, 2, 3, 4.
Cellularia neritina, var., *Johnst. Brit. Zooph.* i. 340, ed. 2.
Bugula neritina, var., *b, c, d, e, Gray, List Brit. Rad.* 114.
*Hab.* Britain (north?).

3. CELLULARIA ORNATA. Pl. XXVI. figs. 3, 4.

Cells immersed, nearly square; front surrounded by a raised line, within which the surface is granular; five to seven minute, scarcely conspicuous perforations behind.

*Hab.* Algoa Bay.

2. MENIPEA.

Cells oblong, or elongated and attenuated downwards; imperforate behind, with a sessile avicularium frequently absent on the upper and outer angle, and one or two sessile avicularia on the front of the cell below the aperture.

Menipea, *Lamx. Bull. Soc. Philom.* 1812, *Polyp. Flex.*
Cellaria, part., *Linn., Solander.*
Crisia, part., *Lamx. Polyp. Flex.* 61.
Tricellaria, *Flem. Brit. Anim.* 540, 1828; *Blainv. Man. d'Act.* 458; *Gray, Brit. Rad. B. M.* 113.

The essential character employed to distinguish this genus, is the presence of one or more sessile avicularia on the front of the cells below the aperture, and usually of a sessile avicularium at the upper and outer angle. Although these characters are in themselves artificial, yet the group formed by the aid of them appears to be for the most part pretty natural. With the exception of one or perhaps two species, at present referred to this genus, the *Menipeæ* have three or six cells only in each internode. The branches are consequently loose and straggling, and usually incurved at the extremities, as is best seen in *Menipea cirrata.*

In the aberrant species above referred to the cells are numerous in each internode, usually tri- or multiserial. The genus appears to enjoy a wide geographical range, occurring from the arctic circle in a species not here described, to the southern points of South America and of Africa.

*a.* Operculatæ. *Cells with a pedunculate operculum protecting the aperture.* Tricellaria.

1. MENIPEA FUEGENSIS. Pl. XIX.

Cells elongated, three in each internode. Operculum simple, acicular, curved; three to four spines on the upper border. Anterior avicularium single.

*Hab.* Tierra del Fuego, low water, *Darwin*; Falkland Islands, *Hooker*.

2. MENIPEA TERNATA. Pl. XX. figs. 3, 4, 5.

Cells elongated, much attenuated downwards, three in each internode. Operculum expanded, entire; two spines on the upper margin. Anterior avicularium single.

Cellaria ternata, *Ellis and Soland. Zooph.* 30.
Sertularia ternata, *Turt. Gmel.* iv. 687.
Crisia ternata, *Lamx. Corall. Flex.* 61.
Tricellaria ternata, *Flem. Brit. Anim.* 540; *Blainv. Act.* 458; *Gray, Brit. Rad.* 113.
Cellularia ternata, *Johnst. Hist. Brit. Zooph.* ed. 2. p. 335. t. 59.
*Hab.* Britain.

*β.* Inoperculatæ. *Without a pedunculate operculum.* Menipea.

3. MENIPEA CIRRATA. Pl. XX. figs. 1, 2.

Cells pyriform, constricted below, six in each internode, one of the lower usually more or less aborted; usually one large lateral avicularium to each internode; three marginal spines very long and strong; anterior avicularium single, its upper border toothed.

Cellaria cirrata, *Ellis and Soland. Zooph.* 29. t. 4. fig. *d*, D.
Cellaria crispa, *Pall. Elench. Zooph.* 71.
Sertularia crispa, *Gmel. Syst. Nat.* ed. 13. 3860, and
Sertularia cirrata, *ib.* 3862.
Tubularia cirrata, *Esper, Pf. T.* t. 7. fig. 1–3; *Seba, Thesaur.* iii t. 101. no. 8.
Menipea cirrata, *Lamx. Exposit.* p. 7. pl. 4. fig. D, D 1; *Krauss. Cor. und Zooph. d. Süds.* p. 32.
*Hab.* South Africa.

4. MENIPEA TRISERIATA. Pl. XXIII. figs. 2, 3, 4.

Cells oblong, rectangular (behind), bi-triserial, numerous. Aperture oval, pointed below, and there partially filled in by a granulated expansion; one or two marginal spines on each side above. Ovicell rounded, cucullate, smooth; lip of opening entire.

*Hab.* South Africa.

5. MENIPEA MULTISERIATA. Pl. LX.

Cells oblong, rectangular, slightly constricted at the waist (behind); multiserial, numerous. Aperture oval, partially filled in by a granulated expansion below; a marginal spine on each side above. Ovicell large, square, with a strong and long, ascending, central umbo in front; the front lip of the opening emarginate; a radical tube inserted into the lower part of each marginal cell behind.

*Hab.* ——? B. M. (an var. prec.)?

Although here placed under another name, there is perhaps little doubt but that this form is merely a variety of the preceding. The difference in the form of the lower part of the aperture, which in *M. triseriata* is described as pointed, and which in the present species usually appears square or rounded, seems to be owing to the encroachment upon it of the large ovicell. The central umbo in front of that organ, though at first sight a strongly characteristic diagnostic mark, may, as frequently happens, be owing to local conditions. It is a very common thing, especially among the *Lepraliæ*, that a boss-like projection of a similar kind should be thrown out on the front of the cell or of the ovicell, and usually upon both; and it is not improbable that the umbo on the ovicell in *M. multiseriata* may be of the same kind,—a protective spine.

6. MENIPEA PATAGONICA. Pl. XXIII. fig. 1; Pl. XXV.; Pl. XXVI. figs. 1, 2.

Cells elongated, slightly narrowed below, six in each internode; mouth oval, simple; a very large and long spine on the upper and outer angle, below which is a sessile avicularium; a single spine on the inner edge of the aperture. Anterior avicularium single, small.

*Hab.* Falkland Islands, *Hooker*; *Darwin*. Port Desire, Patagonia, *Darwin*.

In Pl. XXV. this species is inadvertently named *Cellularia*. It is a species very variable in the size and form of the cells, and several figures therefore of its various forms have been given. In

Pl. XXIII. fig. 1, is shown the mode in which the polyzoary seems to originate in a single cell, which is attached by a corneous tube to some foreign base. And in Pl. XXVI. fig. 2, is shown a curious cup-shaped appendage attached by means of a similar tube to the bottom of a cell.

### 3. Scrupocellaria.

Cells rhomboidal, with a sinus on the outer and hinder aspect; each furnished with a sessile avicularium at the upper and outer angle, and with a vibraculum placed in the sinus on the outer and lower part behind. Aperture oval or subrotund, spinous above, with or without a pedunculate operculum. Cells biserial and numerous in each internode.

Scrupocellaria, *Van Beneden, Recherch.* 43; *Gray, List of Brit. Rad. B. M.* 111.
Bicellaria, sp. *Blainv.* 1830.
Cellularia, sp. *Pallas*; *Flem.*
Cellaria, sp. *Soland.*; *Lamk.* 1816.
Scruparia, sp. *Oken, Lehrb. Nat.* 90, 1816.

This natural genus is characterized more particularly by the presence upon *each* cell of a sessile avicularium, seated, or in fact forming the upper and outer angle, and of a vibraculum placed on the back of the cell. The cells in some species are provided with a pedunculate operculum, by which it is intended to designate a process, which arising by a short tube from the anterior wall of the cell, immediately beyond the inner margin of the opening, projects forwards and bends over the front of the cell, expanding into a variously-formed limb, and serving as protection to the mouth of the cell in front. The cavity of the tube by which the process arises, becomes, in the expanded portion, continuous with variously disposed grooves or channels which terminate at the edges of the operculum. This organ affords excellent specific characters (not in this genus alone). Besides the sessile avicularia above noticed, many species of this genus also possess avicularia of another kind, and which are placed on the front of the cell below the opening and towards the inner side, or in other words, towards the middle line of the branch. In this genus, in all those species in which the second avicularium occurs, each individual cell is provided with one. This additional avicularium appears to be composed of a flexible material, and it is very easily broken off, so that in many instances, perhaps throughout an entire specimen, the organ itself may be wanting, although its position is clearly evidenced by the existence of a rounded opening in the usual situation of the organ. It is necessary to distinguish this form of flexible (if such it be) avicu-

larium from the truly articulated and moveable avicularia, in the form of birds' heads, and which form does not occur in the genus *Scrupocellaria*.

*a*. Operculatæ. *Aperture protected by a pedunculate operculum.*

1. SCRUPOCELLARIA CERVICORNIS. Pl. LXII.

Operculum large, expanded, marked with channels branching like the horns of a stag. The marginal spine next above the peduncle of the operculum bifurcate.

Scrupocellaria cervicornis, *Busk, Voy. of Rattlesn.* i. 370.
*Hab.* Off Cumberland Island, 25 fathoms.

A small delicate parasitic species, very transparent. The very peculiar markings on the operculum at once distinguish it. The upper margin of the mouth is furnished with five elongated spines, the innermost of which is forked at the extremity.

2. SCRUPOCELLARIA DIADEMA. Pl. XXVIII. figs. 1, 2, 3.

Operculum slightly expanded at the extremity, entire, or obscurely bilobed. A sessile avicularium in front, below the aperture. Ovicell with a single row of four or five openings immediately above the lower border.

Scrupocellaria diadema, *Busk, Voy. of Rattlesn.* i. 370.
? Acamarchis Bertholletii, *Savig. Egypt.* pl. 11. fig. 3.
*Hab.* Moreton Bay, *R.*

3. SCRUPOCELLARIA SCRUPEA. Pl. XXI. figs. 1, 2.

Operculum reniform, entire; four to five marginal spines above.

Scrupocellaria scrupea, *Busk, Ann. Nat. Hist.* 2nd series, vii. 83. pl. 9. figs. 11, 12.
*Hab.* Britain (south?).

4. SCRUPOCELLARIA MACANDREI. Pl. XXIV. figs. 1, 2, 3.

Operculum expanded, irregularly reniform, entire. Margin of aperture incrassate, granulose below with a minute spine above and on the outer side, usually absent. Radical tubes toothed.

? Crisia Delilii, *Savigny, Egypt.* pl. 12. fig. 3.
*Hab.* Coast of Spain, *M'Andrew.*

*β*. Inoperculatæ. *Without a pedunculate operculum.*

5. SCRUPOCELLARIA CYCLOSTOMA. Pl. XXVIII. figs. 4, 5.

Aperture subcircular; margin thickened, with three small spines

above. A large anterior sessile avicularium below the aperture. Ovicell —— ?

Scrupocellaria cyclostoma, *Busk, Voy. of Rattlesn.* i. 370.
*Hab.* Bass' Strait, 45 fathoms.

6. SCRUPOCELLARIA FEROX. Pl. XXII. figs. 1, 2 & 5.

Aperture broad, oval, pointed below. Margin rounded, unarmed. An anterior avicularium frequently as wide as the cell below the aperture; external avicularium very small. Ovicell punctured all over.

Scrupocellaria ferox, *Busk, Voy. of Rattlesn.* i. 370.
*Hab.* Louisiade Archipelago. Bass' Strait.

Distinguished at a glance from the preceding species by the enormous anterior avicularium, which is often nearly as capacious as the cell itself, and would, in the living state, afford an excellent opportunity of investigating the structure and nature of these appendages. The radical tubes in this species, as in *S. macandrei*, are curiously serrated.

7. SCRUPOCELLARIA SCRUPOSA. Pl. XXII. figs. 3, 4.

Cells subelongate, narrow. Aperture elliptical, with three or four spines above. Ovicell smooth.

Creeping stony Coralline, *Ellis, Corall.* 38. no. 4. pl. 20. *c*, C.
Celliferous Coralline with angular edges to its cells, *Ellis, Phil. Trans.* xlviii. pl. 13. no. 7; *Phil. Trans. abridg.* x. 493. fig. 7. K, L.
Sertularia scruposa, *Linn. Syst.* 1315; *Esper, Pflanz. Sert.* t. 15. figs. 1–3; *Berk. Syn.* i. 220.
Cellularia scruposa, *Pall. Elench.* 72; *Flem. Brit. Anim.* 539; *Couch, Zooph. Cornw.* 57; *Corn. Faun.* iii. 126. pl. 23. fig. 2; *Reid, Ann. & Mag. Nat. Hist.* xv. 69. & xvi. 388; *Johnst. Hist. Brit. Zooph.* ed. 2. 336. t. 58. figs. 5, 6.
Cellaria scruposa, *Ellis and Soland. Zooph.* 23; *Bosc, Vers*, iii. 132. pl. 29. fig. 7; *Lamk. Anim. s. Vert.* ii. 141, ed. 2. ii. 192; *Johnst. Trans. Newc. Soc.* ii. 261. pl. 11. fig. 5.
Scruparia scruposa, *Oken, Lehrb. Nat.* 90.
Crisia scruposa, *Lamour. Corall.* 60; *Templeton, lib. cit.* ix. 469.
Bicellaria scruposa, *Blainv. Act.* 459.
Scrupocellaria scruposa, *Van Beneden, Recherch.* 43 & 50. pl. 5. figs. 8–16; *Busk, Ann. Nat. Hist.* 2nd Ser. vii. pl. 9. figs. 8, 9, 10; *Gray, List Brit. Rad. B. M.* 111.
*Hab.* Britain. Seas of Europe.

### 4. Canda.

Cells rhomboidal, situated on the outer side for the lodgment of a vibraculum. No avicularium on the upper and outer angle.

Canda, *Lamx.* 1816, *Pol. flex.*; *Blainv.* 1830; *Gray, List Brit. Rad. B. M.*
Cellaria, sp. *Lamk.* 1816.
Cellarina, *Van Bened. Bull. Acad. Brux.* 1849, 645.
Bicellaria, sp. *Blainv.* 1830.
Scrupocellaria, *Gray, List Brit. Rad. B. M.* 112.

This genus is at once distinguished from *Scrupocellaria*, to which it is otherwise closely allied, by the absence of the sessile avicularium on the upper and outer angle in front, and also by the circumstance, that although there are flexible anterior avicularia, they do not correspond in number with the cells, but seem to be disposed in a special tract along the middle of the branch or internode. The connexion of the branches by transverse tubular fibres is not a character of either generic or specific importance, though it is more striking in the only species hitherto known as belonging to this genus than in any other. These transverse tubular fibres are, like the radical fibres in *Scrupocellaria*, always inserted, not into the body of a cell, but into a vibraculum. They are evidently of the nature of a byssus.

#### 1. Canda arachnoides. Pl. XXXIII.

Cells biserial; aperture oval, truncated above, and the upper margin recedent, with a spine on each side, the outer the longer. Surface of cell covered with transparent granulations. An irregular number of sessile avicularia along the median line of each branch. Branches connected by numerous tubular fibres.

Canda arachnoides, *Lamx. Exp. Méth.* 5. pl. 64. figs. 19–22; *Blainv. Man. d'Act.* 457. pl. 79. fig. 2 (not *Gray, Brit. Rad.* 113); *Busk, Voy. of Rattlesn.* i. 371.
Cellaria filifera, *Lamk. An. s. V.* 2nd ed. ii. 177.
? Acamarchis Jolloisii, *Savig.* pl. 11. fig. 2.
*Hab.* Bass' Strait, 45 fathoms.

#### 2. Canda reptans. Pl. XXI. figs. 3, 4.

Cells constricted below. Aperture oval, with three or four marginal spines and a pedunculate operculum with a lobate lamina.

Creeping Coralline, *Ellis, Corall.* 37. pl. 20. no. 3. fig. *b*, B.
Sertularia reptans, *Linn. Syst.* 1315; *Fabr. Faun. Grœnl.* 445.
Sertularia repens, *Berk. Syn.* i. 220.
Cellularia reptans, *Pall. Elench.* 73; *Flem. Brit. Anim.*; *Johnst.*

*Brit. Zooph.* 291. pl. 38. figs. 3, 4; *Couch, Zooph. Cornw.* 57; *Corn. Faun.* iii. 127. pl. 23. fig. 3; *Reid, Ann. & Mag. Nat. Hist.* xvi. 385; *Johnst. Hist. Brit. Zooph.* ed. 2. p. 337. t. 58. figs. 3, 4.

Cellaria reptans, *Ellis and Soland. Zooph.* 23; *Lamk. Anim. s. Vert.* ed. 2. ii. 191; *Johnst. Trans. Newc. Soc.* ii. 262.

Scruparia reptans, *Oken, Lehrb. Nat.* 90.

Crisia reptans, *Lamour. Corall.* 60; *Templeton, Mag. Nat. Hist.* ix. 469.

Bicellaria reptans, *Blainv. Man. d'Act.* 459; *Cuv. R. A. Ill.* t.

Acamarchis Geoffroyi, *Audouin, Expl.* i. 241; *Savigny, Egypt.* pl. 11. fig. 4.

Scrupocellaria reptans, *Gray, Brit. Rad.* 112.

*Hab.* Britain (ubique).

### 5. Emma.

Cells in pairs or triplets. Opening more or less oblique, subtriangular, partially filled up by a granulated calcareous expansion. A sessile avicularium (sometimes absent) on the outer side below the level of the opening.

Emma, *Gray, Dieffenb. N. Zealand,* ii. 293; *Busk, Voy. Rattlesn.* 1. 373.

This genus appears to be a natural one, though apparently allied to *Tricellaria* (Fleming). The more important points of distinction consist in the conformation of the opening of the cell, and in the position of the avicularium when the latter organ is present. The lower half of what would otherwise be the oral opening of the cell is filled up by a thin plate of calcareous matter, granulated on the surface, and by which the actual opening is rendered more or less subtriangular, the mouth being placed just below the apex of the triangle. The margin of the opening is considerably raised, especially at the oral end, so that the opening appears to be situated in a deep depression. This character of opening, however, occurs also in a triserial species of *Cellularia* from Algoa Bay. The position of the avicularium, entirely *below* the level of the opening on the outer side of the cell, is the peculiar characteristic of *Emma* as distinguished from *Menipea*, in which that organ when present is placed in the upper and outer angle, as in *Cellularia* proper and *Scrupocellaria*. It is worthy of notice, that avicularia may be present in every cell in some specimens, and most usually, whilst in others of equal size there will be none at all apparent. So that the position of these organs in this genus, as well as in others, is of more importance systematically than even their existence.

1. EMMA CRYSTALLINA. Pl. XL.

Cells in pairs; one, two or three spines on the outer edge, the central usually the longest and strongest.

Emma crystallina, *Gray, Dieffenb. New Zealand.* ii. 293; *Busk, Voy. of Rattlesn.* i. 373.
*Hab.* Bass' Strait, 45 fathoms. New Zealand, *Hooker.*

Parasitic upon Polyzoa, &c., circinate, branched; branches irregular, divaricate. The opening of the cell triangular, very obliquely placed.

2. EMMA TRICELLATA. Pl. XLI.

Cells in triplets; three or four long spines on the upper and outer part; a small spine on the inner and lower part of the margin of the aperture.

Emma tricellata, *Busk, Voy. of Rattlesn.* i. 373.
*Hab.* Bass' Strait. New Zealand, *Hooker.*

Parasitic upon *Catenicella*, &c. Habit long, straggling, very like the preceding species. The cells are more infundibuliform, and the avicularium, which, as in *E. crystallina*, is not always present, is larger, but occupies the same position on the cell.

§ 2. INARTICULATA seu CONTINUA. *Polyzoary continuous throughout.*

§§ 1. UNISERIALARIA. *Cells disposed in a single series.*

Fam. 4. SCRUPARIADÆ.

Cells uniserial. Junctions rigid or of the same consistence as the cells. Polyzoary usually loosely adnate.

Crisiadæ (part.), *Gray. Syn. Brit. Mus.* 1842, 135.
Scupariadæ, *Gray, List of Brit. Rad. B. M.* 132, 149.
Eucratiadæ, *Johnst. B. Z.* ed. 2. 288.

*Synopsis of Genera.*

1. Scruparia.
2. Hippothoa.
3. Ætea.
4. Beania.

1. SCRUPARIA.

Cells decumbent; aperture oblique, subterminal. Branches given off from the front of a cell below the aperture.

Scruparia *a*, *Oken, Lehrb. Nat.* 90, 1815.

Eucratea, *Johnst. Brit. Zooph.* ed. 2. 289.
Eucratea, sp. *Lamx. Bull. Soc. Phil.* iii. (1812); *Flem.* 1828.
Unicellaria, sp. *Blainv. Dict. Sci. Nat.* lx. (1830).
Scuparia, *Gray, Brit. Rad.* 132.

1. SCRUPARIA CHELATA. Pl. XVII. fig. 2.

Cell in the form of a horn. Aperture oblique. Frequently an aborted or rudimentary cell below the aperture in front.

Bull's-horn Coralline, *Ellis, Corall.* 42. no. 9. pl. 22. fig. *b*, B.
Sertularia chelata, *Linn. Syst.* ed. 10. 816.
Cellularia chelata, *Pall. Elench.* 77.
Sertularia loricata, *Linn. Syst.* 1316; *Berk. Syn.* i. 220; *Esper, Pflanz. Sert.* t. 29. figs. 1, 2; *Turt. Gmel.* iv. 686; *Turt. Brit. Faun.* 217; *Stew. Elem.* ii. 449.
Cellaria chelata, *Ellis and Soland. Zooph.* 25; *Bosc, Vers,* iii. 134; *Lamk. Anim. s. Vert.* ii. 140, ed. 2. ii. 189.
Eucratea chelata, *Lamx. Bull. Soc. Phil.* 1812, iii. 184; *Corall.* 64. pl. 3. fig. 5; *Expos. Méthod.* 8. pl. 65. fig. 10; *Johnst. Hist. Brit. Zooph.* ed. 2. 289.
Scruparia chelata, *Oken, Lehrb. Nat.* 90; *Gray, List Brit. Rad.*
Eucratea loricata, *Flem. Brit. Anim.* 541.
Eucratée cornée, *M.-Edw. Ann. d. Sc. Nat.* n.s. ix. 204. pl. 8. f. 1.
Unicellaria chelata, *Blainv. Act.* 461. pl. 77. fig. 2.
Crisia chelata, *Johnst. Brit. Zooph.* 261; *Reid, Ann. & Mag. Nat. Hist.* xvi. 392; *Couch, Corn. Faun.* iii. 98. pl. 18. fig. 1.
*Hab.* Europe; Australia.

2. HIPPOTHOA.

Cells decumbent, adherent; branches given off from the sides of the cells.

Hippothoa, *Lamx. Exp. Méth.* 82, 1821; *Gray, Zool. Misc.* 34; *List. of Brit. Rad.* 115, 147; *Johnst. Brit. Zooph.* ed. 2. 291 (not *Syn.*).
Catenicella (part.), *Blainv.* 1830 (agrees with *character*), not *M.-Edwards.*
"Terebripora, *D'Orbigny.*"
Tubulipora, sp. *Jameson.*

1. HIPPOTHOA CATENULARIA. Pl. XVIII. figs. 1, 2.

Cells contiguous, ovate, thick; aperture oblique, oval; branches irregular.

Tubipora catenularia, *Jameson, Wern. Mem.* i. 561.
Tubipora catenulata, *Stew. Elem.* ii. 425.
Hippothoa catenularia, *Flem. Brit. Anim.* 531; *Hassall, Ann. & Mag. Nat. Hist.* vi. 170; *Couch, Zooph. Cornw.* 43; *Corn.*

*Faun.* iii. 101. pl. 18. fig. 5; *Johnst. Hist. Brit. Zooph.* ed. 2. p. 291. t. 50. figs. 9, 10; *Gray, Brit. Rad.* 116.
Hippothoa Elliotæ, *Gray, Zool. Misc.* 34.
*Hab.* Seas of Europe (ubique).

2. HIPPOTHOA DIVARICATA. Pl. XVIII. figs. 3, 4.

Cells remote, ovate lanceolate or fusiform; subcarinate in front; aperture small, with a notch in the lower margin. Ovicells small, superior, galeriform; branches given off at right angles, and usually in opposite pairs.

Hippothoa divaricata, *Lamx. Expos. Méth.* 82. t. 80. figs. 15, 16; *Johnst. Hist. Brit. Zooph.* ed. 2. 292. t. 51. figs. 3, 4; *Audouin, Expl.* i. 239; *Savign. Egypt.* pl. 12. f. 2 (with ovicells).
Catenicella divaricata, *Blainv. D. S. N.* 1830, lx. 427; *Man. Act.*
Hippothoa lanceolata, *Gray, Zool. Misc.* 35; *Hassall, Ann. & Mag. Nat. Hist.* vii. 366. pl. 8. figs. 5, 6; *Couch, Zooph. Cornw.* 43; *W. Thompson, Ann. Nat. Hist.* v. 252; *Couch, Corn. Faun.* iii. 102. pl. 18. fig. 6.
*Hab.* Britain. Seas of Europe.

3. HIPPOTHOA PATAGONICA. Pl. XVII. fig. 1.

Cells oval, irregularly attenuated downwards, irregularly annulate, thick; opening small, with a notch on the lower lip.

*Hab.* Coasts of Patagonia, Falkland Islands, *Darwin.*

The difference between this and the preceding one is hardly greater than what occurs in many of the Polyzoa under different circumstances of age and situation; but upon comparison of the oldest cells and the most thickened I have been able to meet with in *Hipp. divaricata*, I am satisfied that the distinction between that species and the present is a good one.

3. ÆTEA.

Cells tubular, erect, scattered, rising from a creeping fistular fibre adnate to a foreign base. Aperture terminal or subterminal.

Ætea, *Lamx. Bull. Soc. Phil.* 1812, char.; *Gray, Brit. Rad.* 133.
Anguinaria, *Lamk.* 1812 (no char.); *Johnst. Br. Zooph.* ed. 2. 292.
Falcaria β, *Oken, Lehrb. Nat.* 91, 1815.

The name *Anguinaria* appears on the plates devoted to the species of this genus, but subsequent consideration having shown the justice of recurring to Lamouroux's appellation, his term has been adopted in the text.

1. ÆTEA ANGUINA. Pl. XV. fig. 1.

Cells spatulate at the end; curved, ringed.

Snake Coralline, *Ellis, Corall.* 43. no. 11. pl. 22. fig. *c*, C, D.
Sertularia Anguina, *Linn. Syst.* ed. 10. 816; *Linn. Syst.* 1317; *Turt. Gmel.* iv. 686; *Berk. Syn.* i. 220; *Turt. Brit. Faun.* 217; *Stew. Elem.* ii. 449; *Esper, Pflanz. Sert.* t. 16. figs. 1, 2; *Oliv. Zool. Adriat.* 291.
Cellularia Anguina, *Pall. Elench.* 78; *Ellis, Phil. Trans.* lvii. 437. pl. 19. fig. 10; *Hogg's Stock.* 35.
Cellaria Anguina, *Ellis and Soland. Zooph.* 26; *Bosc, Vers*, iii. 135.
Ætea Anguina, *Lamx. Bull. Soc. Phil.* 1812, iii. 184; *Corall.* 65. pl. 3. fig. 6; *Exp. Méth.* 9. t. 65. fig. 15; *Gray, Brit. Rad.* 133.
Falcaria Anguina, *Oken, Lehrb. Nat.* 91.
Sertularia mollis, *D. Chiaje, Anim. s. Vert. Nap.* iv. 147.
Anguinaria Anguina, *Flem. Brit. Anim.* 542; *Lister, Phil. Trans.* 1834, 385. pl. 12. fig. 4; *Blainv. Act.* 467. pl. 79. fig. 3.
Anguinaria spatulata, *Lamk. Anim. s. Vert.* ii. 143, ed. 2. ii. 196; *Stark. Elem.* ii. 439; *Thompson, Ann. Nat. Hist.* v. 252; *Couch, Zooph. Cornw.* 44; *Corn. Faun.* iii. 103. pl. 19. fig. 2; *Johnst. Hist. Brit. Zooph.* ed. 2. 290. t. 50. figs. 7, 8; *Busk, Trans. Microsc. Soc.* 1848, 15.
*Hab.* Britain, Seas of Europe, Atlantic Ocean, Antarctic Ocean, Tasmania, &c.

2. ÆTEA DILATATA. Pl. XV. figs. 2, 3.

Cells cyathiform at the apex; curved, ringed. Aperture largely dilated, suborbicular.

Anguinaria dilatata, *Busk, Ann. Nat. Hist.* 2nd ser. vii. 85. pl. 9. fig. 14.
*Hab.* Torres' Strait. Port Philip.

3. ÆTEA LIGULATA. Pl. XLII.

Cells very long, truncate at the extremity, straight; mouth terminal; surface not ringed; cell constricted immediately below the aperture.

*Hab.* Coast of Patagonia; Straits of Magellan; *Darwin.*

4. ÆTEA TRUNCATA.

"Cells short, straight, narrowed at their origin, extremity truncate, mouth terminal, surface punctate, not ringed."

Ætea truncata, *Landsborough.*
*Hab.* Coast of Arran; on Laminaria.

It is nearly allied to *Æ. ligulata*, but quite distinct.

### 4. Beania.

Polyzoary confervoid, subcorneous or calcareous. Cells arising one from another by a slender filiform tube given off from the lower part of the cell, which is open in front, the edges of the opening furnished with hollow spinous processes arching over the opening. Mouth terminal, with a denticle on each side.

Beania, *Johnst. Brit. Zooph.* ed. 2. p. 371; *Gray, Brit. Rad.* 96.

Though ranged among the Vesiculariadæ by Dr. Johnston, this "remarkable" genus, as he justly terms it, is clearly to be referred to the Cheilostomatous suborder. It is nearly allied on the one hand to *Ætea*, and on the other, through *Diachoris*, to the Flustradæ. As in *Diachoris*, the aperture occupies nearly the entire front of the erect cell. It differs however from that genus in the uniserial arrangement of the cells, and the marginal spines which defend the sides and front of the aperture.

1. Beania mirabilis. Pl. XXIV. figs. 4, 5.

Costæ seven to ten on each side.

Beania mirabilis, *Johnst. Ann. Nat. Hist.* v. 272; *Hist. Brit. Zooph.* ed. 2. p. 372. f. 69, 70.
*Hab.* Britain, on shells.

2. Beania australis. Pl. XVI. figs. 1, 2, 3.

Costæ eighteen to twenty on each side.

*Hab.* Coast of Patagonia; Cape Horn, *Darwin*, on shells and fucus.

This species sometimes appears to form a connected frond, but the cells are not so regularly interconnected as in *Diachoris*, and are most usually truly uniserial.

§§ 2. Bi-multiserialaria. *Cells disposed in a double or multiple series.*

### Fam. 5. Farciminariadæ.

Cells disposed round an imaginary axis, alternate, forming cylindrical branches of an erect, dichotomously divided, continuous polyzoary.

Farciminariadæ, *Busk, MSS.*

### 1. Farciminaria.

Corneous, flexible; margin of cell much raised; aperture occupying the whole front of the cell. Ovicell cucullate.

Farciminaria, *Busk, MSS.*

See observations under the genus *Salicornaria*, p. 16. A second and very curious species of this genus, from South Africa, has occurred since this Catalogue was drawn up, which will be afterwards described.

1. FARCIMINARIA ACULEATA, n. s. Pl. LXIV. figs. 4, 5; Pl. LXV. (*bis*) fig. 6.

Sides of cells within the margin beset with furcate spines. Ovicell cucullate, external; surface aculeate.

*Hab.* Tasmania, *Hooker*; New Zealand, *Lyall.*

### Fam. 6. GEMELLARIADÆ.

Cells opposite in pairs.

Gemellariadæ, *Busk, Voy. of Rattlesn.* i. 383.

*Synopsis of Genera.*

1. Gemellaria.
2. Didymia.
3. Dimetopia.
4. Notamia.

*a. Each pair arising from the pair next below it. Each pair at a bifurcation giving origin to two pairs; no avicularia.*

In some respects approaching the Bicellariadæ, this family would yet appear to constitute a very natural group, distinguished from the Bicellariadæ, not only by general habit and the peculiar position of the cells in pairs, but also by the absence in all cases of pedunculate and articulated avicularia. Where, in this family, these organs are present, as in *Notamia*, they are of a very peculiar character and in a very peculiar relation to the rest of the polyzoary. It might moreover be remarked, that the association of the genus *Notamia* with the others included in the same family, is somewhat forced and artificial. The very curious structure of the polyzoary in this genus would almost justify its being regarded as the type of a distinct family, in which case the total absence of avicularia would afford an additional diagnostic character of the Gemellariadæ.

With reference to *Emma crystallina*, in which the cells are for the most part in pairs and apparently opposite, it must be observed, that at each bifurcation a third and alternate cell is interposed between the two, and that in *Emma tricellata* there are three *alternate* cells in each internode. When it is noticed also that in *Menipea*, for the most part, the normal number of cells in each internode is three or six, but that the latter number is not

unfrequently reduced to five by the complete or partial abortion of one of the cells, it does not appear improbable that in *Emma crystallina* the apparent gemination of the cells is in fact due to the abortion of a third alternate cell in all the internodes except the one at which the bifurcation takes place.

### 1. Gemellaria.

Cells joined back to back; all the pairs facing the same way. Aperture oval, slightly oblique; at a bifurcation each cell of the primary pair giving off one of the secondary pair.

Gemellaria, *Savigny*, 1805?; *Van Beneden*; *Johnst. Brit. Zooph.* 293; *Gray, List Brit. Rad. B. M.* 133.
Gemicellaria, *Blainv.* 1830.
Loricaria, *Lamx. Expos.* 7 (1821), not *Lacép.*
Notamia, *Flem. Brit. Anim.* 1828.
Loricula, *Cuvier*, 1836.
Crisia, sp. *Lamx.* 1816; *Lamk.* 1816.
Scruparia β, *Oken, Lehrb. Nat.* 90, 1815.

1. Gemellaria loricata. Pl. XLV. figs. 5, 6.

The only species.

Muscus coralloides mollis elatior ramosissimus, *Doody, Raii Syn.* i. 34. no. 6.
Coat-of-mail Coralline, *Ellis, Corall.* 40. no. 7. pl. 21. f. *b*, B.
Sertularia loricata, *Linn. Syst.* ed. 10. 815.
Cellularia loriculata, *Pall. Elench.* 64; *Hogg's Stock.* 35.
Sertularia loriculata, *Linn. Syst.* 1314; *Turt. Gmel.* iv. 684; *Berk. Syn.* 1. 219; *Esper, Pflanz. Sert.* t. 24. f. 1–3; *Turt. Brit. Faun.* 216; *Jameson, Wern. Mem.* i. 564; *Stew. Elem.* ii. 447.
Cellaria loriculata, *Ellis and Soland. Zooph.* 24; *Bosc, Vers.* iii. 133; *Lamk. Anim. s. Vert.* ii. 136, ed. 2. ii. 179; *Johnst. Trans. Newc. Soc.* ii. 262.
Scruparia loricata, *Oken, Lehrb. Nat.* 90.
Crisia loriculata, *Lamx. Corall. Flex.* 140.
Loricaria europæa, *Lamx. Expos. Méthod.* 7.
Notamia loriculata, *Flem. Brit. Anim.* 541; *Farre, Phil. Trans.* 1837, 413. pl. 27. f. 6–9; *Hassall, Ann. & Mag. Nat. Hist* vi. 170; *Couch, Zooph. Cornw.* 42; *Corn. Faun.* iii. 101 pl. 18. f. 4.
Loricula loricata, *Cuvier, Règ. Anim.* ed. 2. iii. 303; *Templeton Mag. Nat. Hist.* ix. 469.
Gemicellaria loriculata, *Blainv. Dict. Sci. Nat.* lx. 425; *Actino* 461. pl. 78. f. 4.

Gemellaria loriculata, *Savig. Egypt. Polyp.*; *Van Beneden, Recherch.* 33. pl. 5. f. 1; *Johnst. Hist. Brit. Zooph.* ed. 2. 293. t. 47. f. 12, 13, 477; *Gray, List Brit. Rad.* 134.
*Hab.* European Seas.

### 2. Didymia.

Cells joined side to side. Aperture large, oval, wholly anterior. Cells all facing the same way. At a bifurcation each cell of the primary pair giving off a secondary pair at the summit.

Didymia, *Busk, Voy. of Rattlesn.* i. 383.

#### 1. Didymia simplex. Pl. XXXIX.

The only species.

Didymia simplex, *Busk, op. cit.* 383, t. 1. f. 6.
*Hab.* Bass' Strait, 45 fathoms.

A fine species, growing in loosely branched tufts to a height of several inches. In some (dried) specimens the branches are slightly incurved, but not in all. The situation of the ovicell is peculiar. It is contained within the upper part of a cell placed between, or rather in front of the pair from which the two branches at a bifurcation take their origin. The ovicelligerous cell differs widely in form from the others, being pyriform and much attenuated below; and the orifice is below the middle. The upper compartment, in which the ovicell itself is lodged, appears to be separated from the lower by a transverse diaphragm.

### 3. Dimetopia.

Cells joined back to back. Aperture oblique; each pair looking in a direction at right angles with that of the next. At a bifurcation the pair being disjoined, each of the disjoined cells gives off a secondary pair.

Dimetopia, *Busk, Voy. of Rattlesn.* i. 384.

#### 1. Dimetopia spicata. Pl. XXIX. fig. 1.

Cells infundibuliform. Margin thickened, with numerous equidistant, elongated, acute spines.

Dimetopia spicata, *Busk, op. cit.* 384. t. 1. f. 9.
*Hab.* Bass' Strait, 45 fathoms; New Zealand, *Lyall*, &c.

White and transparent, forming thick tufts about 1½ to 3 inches or more in height.

#### 2. Dimetopia cornuta. Pl. XXIX. figs. 2, 3.

Cells contracted below the middle. Aperture oblique, wide

above; a strong conical process on each side above; one or two long projecting spines in front, inserted below the margin.

Dimetopia cornuta, *Busk, op. cit.* p. 384. t. 1. f. 7, 8.
*Hab.* Bass' Strait, 45 fathoms.

Branches narrower than in the former species. Colour yellowish. Tufts loose; ovicell small in proportion to the size of the cells. It is placed immediately above and behind the upper margin of the aperture.

*β. Each pair arising from the pair next but one below it, by tubular prolongations. A new series of cells intercalated into each branch at the bifurcation; avicularia.*

### 4. Notamia.

A pair of tobacco-pipe shaped avicularia visible above each pair of cells, each arising from the inferior tubular prolongation of one of the cells in the pair next above.

Epistomia, *Flem. Brit. Anim.* 541, 1828; *Gray, List Brit. Rad.* 82, 147.
Dynamena, sp. *Lamx.* 1816; *Blainv.* 1830.
Notamia, sp. *Flem.* 1828.
Gemicellaria, sp. *Blainv.* 1830.
Sertularia, sp. *Gmelin.*
Cellularia, sp. *Pallas.*

1. Notamia bursaria. Pl. XLV. figs. 1, 2, 3, 4.

The only species.

Shepherd's-purse Coralline, *Ellis, Corall.* 41. n. 8. t. 22. f. *a*, A; *Johnst. Brit. Zooph.* ed. 2. 294, pl. 51, f. 1, 2.
Sertularia bursaria, *Linn. S. N.* 1314; *Berk. Syn.* i. 219.
Cellularia bursaria, *Pall. Elench.* 65; *Ellis, Phil. Trans.* lvii. 437. t. 19. f. 12.
Cellaria bursaria, *Ellis & Soland. Zooph.* 25; *Lamk. Hist. Anim. s. Vert.* ed. 2. ii. 189.
Dynamena bursaria, *Lamx. Cor.* 179; *Blainv. D. S. N.* lx. 448.
Notamia bursaria, *Flem. Brit. Anim.* 541; *Busk, Trans. Micros. Soc.* ii. 110 (1847).
Gemicellaria bursaria, *Blainv. Dict. S. N.* lx. 425; *Man. Act.* 461.
Sertularia bursa, *Turt. Brit. Faun.* 216.
Epistomia bursaria, *Gray, List Brit. Rad.* 82.
*Hab.* Britain (south-east).

The true systematic position of this highly interesting species seems to have been held, even as lately as 1847, in considerable doubt; for although Dr. Johnston, in the 2nd edition of Brit.

Zooph., places it doubtfully next to *Gemellaria*, he at the same time says that he was more inclined then than formerly to arrange it with *Sertularia*. He very shrewdly surmises the real nature of the tobacco-pipe-like processes in comparing them with the "bird's-head" processes in the Cellulariæ, though wrong in supposing that there is any analogy between them and the "somewhat similar organs" in *Laomedea obliqua*. In a paper in the Transactions of the Microscopical Society (cited above), an endeavour is made to show the true nature of this Polyzoon and to describe the somewhat complicated structure of the polyzoary.

### Fam. 7. Cabereadæ.

Polyzoary dichotomously divided into ligulate, bi-multiserial branches; on the backs of which are vibracula, or avicularia, one common to several cells; avicularia sessile.

Cabereadæ, *Busk, Voy. of Rattlesn.* i. 376.

*Synopsis of Genera.*

1. Caberea.
2. Amastigia.

#### 1. Caberea.

Cells bi-multiserial, in the latter case quincuncial. Back of branches covered with large vibracula, which are placed obliquely in two rows, diverging in an upward direction from the middle line, where the vibracula of either side decussate with those of the other. Avicularia, when present, sessile on the front of the cell.

Caberea, *Lamx. Corall.* 128, 1816; *Blainv.* 1830; *Gray, Cat. Brit. Rad.* 147.
Selbia, *Gray, Dieffenb. N. Z.* ii. 292; *Cat. Brit. Rad.* 147.
Crisia (sp.), *Audouin, Expl.*
Cellaria (sp.), *Lamk. Savigny, Egypt.* pl. 12.
Cellularia (sp.), *Fleming, Johnst.*

*α*. Opercularatæ. *With a pedunculate operculum in front of the aperture.*

The remarkable feature of this genus resides in the vibracula, which here appear to attain their utmost development. Each vibraculum appears to belong, not to a single cell, as in *Scrupocellaria*, but to be common or applied to the backs of several. They are more or less pyriform or long oval in shape, and the two rows decussate with each other along the middle of the branch, giving, in the narrower forms especially, much of the aspect of an ear of barley, and in the wider of a straw plait. The walls of the vibracula are usually thin and very transparent, so as

to allow the outlines of the cells to be seen imperfectly through them. The upper extremity of the vibraculum is bifid, and to the inner horn or tooth is articulated the "seta," and from the notch between the two horns there is continued nearly, if not quite to the inner or lower extremity of the organ, and along its upper border, a shallow groove, in which is lodged the seta when in a state of rest. In most species the seta is serrated on one side with distant teeth.

1. CABEREA RUDIS. Pl. XLVI.

Multiserial. Aperture oval, margin much thickened, with a strong projecting upturned spine on each side, in the central cells, and with three strong and long spines on the outer side, and a smaller one on the inner side in the marginal cells. Operculum spatulate, wide, entire. Each cell of the central rows with two small avicularia in front immediately below the aperture. Each marginal cell with a single large avicularium in front below the aperture. Vibracula slender, very transparent. Setæ short, not serrated.

Caberea rudis, *Busk, Voy. of Rattlesn.* i. 377.
*Hab.* Bass' Strait.

Colour dirty white. Forms a broad frondose polyzoary 2 inches or more in height. The branches all disposed in the same plane, are flat, thick, and about $\frac{1}{8}$th inch wide, composed of 4–6 rows of comparatively small cells, which viewed behind appear lozenge or diamond-shaped, and arranged quincuncially. It is not always easy to observe with accuracy the outline of the vibracula, owing to the extreme tenuity of their walls, but the groove along the upper border is very distinct, and most usually has the seta lying in it. The avicularia on the marginal cells are very large, but not uniform in size. Along each border of the branches runs a bundle of radical tubes, the number of which diminishes as the branch ascends, owing to the circumstance that each tube terminates in the base of a vibraculum.

2. CABEREA BORYI. (*Cab. zelanica*, Pl. XVI. figs. 4, 5. *Cab. patagonica*, Pl. XXXVIII.)

Cells biserial; aperture oval, pedunculate operculum expanded principally downwards, and sometimes sending off a process to the opposite side of the aperture; a single spine on the inner side springing from the peduncle of the operculum; two marginal spines on the outer side of the aperture. Ovicell large, arcuate. Vibracula ovoid. Setæ serrated.

Crisia Boryi, *Aud. Expl.*; *Savign. Egypt.* pl. 12. f. 4.
Selbia zelanica, *Gray, Dieffenb. N. Z.* ii. 292.

Caberea zelanica, *Busk, Voy. of Rattlesn.* i. 378.
*Hab.* Cumberland Island. New Zealand, *Hooker*; E. Falkland Islands; S. Patagonia, 49° S.; Port St. Julian, Patagonia; Strait of Magellan, *Darwin*; Coast of Devon, *Miss Cutler*. Algoa Bay.

This appears to be one of the most generally diffused species, and it varies also considerably in some respects, according to its age and other circumstances, perhaps of depth or temperature, &c. To observe the specific characters here assigned, it is necessary to examine the younger or more perfect cells at the extremity of the branches, the older ones by continued deposition of calcareous matter being considerably altered, and also usually deprived of the spines. But the most remarkable difference is in the conformation of the pedunculate operculum. As shown in Pl. XVI. fig. 4, this process extends quite across the aperture of the cell, forming a sort of bridge, from the lower margin of which depends the expanded lamina, and this appears to be the condition in which it was figured by Savigny; whilst in Pl. XXXVIII. figs. 2, 6, 7, it will be seen that the operculum is not connected with the opposite side of the aperture, but of the more usual form. Upon sufficient examination however it will be found that both forms run insensibly into each other. The recent discovery of this species on the coast of Devonshire is of great interest. It there grows in minute tufts upon *Eschara foliacea*, and has probably hitherto been overlooked, owing to its resemblance to *Canda reptans*.

*β*. Inoperculatæ. *No pedunculate operculum.*

3. Caberea Hookeri. Pl. XXXVII. fig. 2.

Bi-triserial. Marginal cells with two marginal spines above and one on the inner side. Central cells with a marginal spine on each side of the aperture above. Setæ serrated.

Cellularia Hookeri, *Flem. Brit. Anim.* 539 (1828); *Johnst. Hist. Brit. Zooph.* ed. 2. 338. t. 60. f. 1, 2.
Bicellaria Hookeri, *Blainv. Dict. Sc. Nat.* lx. 424.
*Hab.* Torquay, *Hooker*; Orkneys, *E. F. Barlee*.

? 4. Caberea lata. Pl. XLVII.

Bi-multiserial; marginal cells with a single subapical spine; central cells without marginal spines; setæ serrated.

Caberea lata, *Busk, op. cit.* i. 378.
*Hab.* Australia; New Zealand (an præced. varietas ?).

Colour white or yellowish; forms close rounded tufts 2 to 3 inches high and wide, composed of uniform dichotomously divided branches about $\frac{1}{4}$th of an inch wide, and which become wider towards their truncate extremities. The vibracula are very large, and though distinctly defined, are yet sufficiently transparent to allow a view of the lozenge-shaped cells. The central rows of cells vary in number from two to five, and the cells composing them are arranged with extreme regularity. The marginal rows are placed in a plane posterior to the central, and the cells of which they are composed are widely different from the central.

It is not easy to distinguish the narrower forms of this species from *Caberea hookeri*, and they may not improbably really belong to one and the same species, differing only in consequence of the difference in the localities in which they are found. The warmer latitudes of New Zealand and Australia may readily be supposed to produce a more luxuriant growth, and consequently wider and stronger branches of the polyzoary. But there are other differences, which though less obvious, would better serve to indicate a specific distinction between the two forms. In *Cab. hookeri* there is a large tubular spine on each side of the mouth in the lateral cells, and each of the central cells, or nearly so, are furnished with an anterior avicularium, below the aperture and to one side. The lateral avicularium also of the marginal cells is much larger.

### 2. Amastigia (α priv., μάστιξ).

An avicularium to about each three cells on the back of the branches (no vibracula).

In this genus the vibracula on the back of the branches are replaced by avicularia; but it is to be remarked that in these avicularia, contrary to what usually obtains in those organs, the moveable mandible, when closed, points downwards; in this respect resembling the seta of the vibraculum, with which it is in fact strictly homologous.

#### 1. Amastigia nuda. Pl. XXXVI.

Cells bi-quadriserial; posterior avicularia small, the mandible pointing downwards. A lateral and anterior avicularium to each lateral cell: an anterior one to each of those in the central rows. Aperture oval, with a broad pedunculate operculum and two spines on each side above.

Caberea nuda, *Busk*, *MSS.* t. 36.
*Hab.* Tierra del Fuego, *Darwin*.

## Fam. 8. Bicellariadæ.

Polyzoary dichotomously divided into narrow ligulate, bi- or multiserial branches. No vibracula. Avicularia when present pedunculate and articulated. Polyzoary erect; phytoid.

Bicellariadæ, *Busk, Voy. of Rattlesn.* i. 373.
Bugulidæ, *Gray, Cat. Brit. Rad.* 110, 146.

*Synopsis of Genera.*

1. Bicellaria.
2. Halophila.
3. Bugula.

### 1. Bicellaria.

Cells turbinate, distant. Aperture directed more or less upwards. Several spines, marginal or dorsal.

Bicellaria, *Blainv. D. S. N.* 1830; *Gray, Cat. Brit. Rad.* 112.
Cellularia, *Flem. Brit. Anim.* 1828.
Cellularia, sp. *Pallas.*
Cellaria, sp. *Soland.*; *Lamk.* 1816.
Bugula *a*, sp. *Oken, Lehrb. Nat.* 89.

#### 1. Bicellaria ciliata. Pl. XXXIV.

Aperture oval looking obliquely upwards and forwards. Five to seven very long, slender, incurved marginal spines on the outer edge of the aperture. One to two dorsal spines. A single, long, slender, submarginal spine at the lower part of the aperture. Ovicell subpedunculate, attached to the inner edge of the aperture. Avicularia capitate, affixed to the lower and outer part of the cell.

Ciliated Coralline, *Ellis, Corall.* 38. no. 5. pl. 20. *d*, D.
Sertularia ciliata, *Linn. Syst.* 1316; *Berk. Syn.* i. 230; *Esper, Pflanz. Sert.* t. 14. f. 1, 2.
Cellularia ciliata, *Pall. Elench.* 74; *Flem. Brit. Anim.* 540.
Cellaria ciliata, *Ellis and Soland. Zooph.* 24; *Lamk. Anim. s. Vert.* ii. 139, ed. 2. ii. 186.
Bugula ciliata, *Oken, Lehrb. Nat.* 89.
Crisia ciliata, *Lamour. Corall.* 60; *Templeton, Mag. Nat. Hist.* ix. 468; *Van Beneden, Mém.* 51. pl. 6. f. 9–11.
Bicellaria ciliata, *Blainv. Act.* 459; *Gray, Cat. Brit. Rad.* 112.
Cellularia ciliata, *Johnst. Brit. Zooph.* 291. pl. 38. f. 1, 2; *Couch. Zooph. Cornw.* 56; *Corn. Faun.* iii. 126. pl. 23. f. 1; *Johnst. Hist. Brit. Zooph.* ed. 2. 335. t. 58. f. 1, 2.
*Hab.* European Seas.

2. BICELLARIA GRACILIS. Pl. XXXII.

Cells much elongated, slender, aperture round or suboval, looking obliquely forwards and upwards; three marginal, and 2–3 submarginal spines above and behind the aperture, and two much longer; curved, hair-like spines on the anterior and lower margin. Ovicells globose, subpedunculate, attached to the upper and inner part of the margin of the aperture. Avicularia small, capitate, on the sides of the cells; rare.

Bicellaria gracilis, *Busk, Voy. of Rattlesn.* i. 374.
*Hab.* Bass' Strait, 45 fathoms.

A delicate slender species, not unlike *B. ciliata* in habit, but sufficiently distinguished from it by the number and arrangement of the spines, and especially by the curious double spine on the front of the cell.

3. BICELLARIA GRANDIS. Pl. XLIV.

Cells tubular below, much expanded above. Aperture oval, the narrow end outwards, looking upwards and forwards; 2–5 long curved submarginal spines; a single dorsal spine on the outer side, about half way down the cell. Avicularia ——? (probably deficient).

Bicellaria grandis, *Busk, l. c.* 374.
*Hab.* Bass' Strait, 46 fathoms.

Quite distinct from *B. ciliata*, not only in its size, which is nearly three times as great, but also in the form of the cells and of the aperture. The number of spines varies very much, and two or three of them not unfrequently arise from a broad common projecting process or base.

4. BICELLARIA TUBA. Pl. XXXI.

Aperture round, looking nearly directly upwards; a digitiform hollow process below the outer border supporting 2–4 long incurved spines; 2–3 other, long curved submarginal spines behind or above the aperture, none below it in front. A solitary spine on the back a short way down the cell. Avicularia very long, trumpet-shaped, arising from the back of the cell.

Bicellaria tuba, *Busk, Voy. of Rattlesn.* i. 373.
*Hab.* Bass' Strait, 45 fathoms.

At once recognizable by the remarkable form and unusual position of the avicularium, and also by the peculiar digitiform spinigerous process on the outer side of the aperture.

## 2. Halophila.

Cells contiguous, attenuated downwards, much expanded upwards with a large plain aperture; unarmed.

Halophila, *Gray, Dieff. New Zealand*, ii. 292, 1843; *Cat. Brit. Rad.* 147.
Bicellaria (sp.), *Busk, Voy. of Rattlesn.* i. 375.

### 1. Halophila Johnstoniæ. Pl. XXX.

Cells obliquely truncated above with a short spine on the outer angle; aperture large, oval. Margin slightly thickened.

Halophila Johnstoniæ, *Gray, l. c.*
Bicellaria flexilis, *Busk, Voy. of Rattlesn.* i. 375.
*Hab.* Bass' Strait; New Zealand.

Of a light grey or lead colour, growing in large loose tufts 3 or 4 inches in height, and composed of long forked ascending branches. There appears to be very little calcareous matter in the substance of the polyzoary, which is consequently soft and flexible. Within some of the cells, in the lower or contracted portion, is a curious little tridentate organ, the nature of which is not obvious.

## 3. Bugula.

Cells elliptical (viewed behind), closely contiguous, bi-multiserial; aperture very large; margin simple, not thickened. Avicularia, when present, pedunculate and articulated (frequently coloured red or blue).

Bugula *α*, sp. *Oken, Lehrb. Nat.* 89, 1815 (type); *Gray, Cat. Brit. Rad.* 114.
Bugula *β*, *Oken, l. c.* 90.
Acamarchis, *Lamx.* 1816; *Blainv.* 1830.
Crisia, sp. *Lamx.* 1812.
Cellularia, sp. *Pallas*; *Johnst. Brit. Zooph.* i. 340 (sp.).
Cellaria, sp. *Soland.*; *Lamk.* 1816.
Bugula, *Gray, List Brit. Rad.* 114.
Avicularia (sp.), *T. V. Thompson, MSS.*
Bugulina (sp.), *Gray, Cat. Brit. Rad.* 114.
Crisularia (sp.), *Gray, Cat. Brit. Rad.* 114, 117.

As the typical species of the genus, as here constituted, is *B. neritina*, which was also taken by Oken as the type of his genus *Bugula*, recurrence to his name appears to be unavoidable, notwithstanding the more general use that has since been made of Lamouroux's appellation, "Acamarchis." The necessary correction must be made in the Plates of this Catalogue.

1. Bugula neritina. Pl. XLIII.

Cells quadrangular, lengthened, with a truncated summit, the angles projecting.

Remarkable Coralline, *Ellis, Phil. Trans. abridg.* x. 345. pl. 8. figs. *a*, A, G; *Ellis, Corall.* 35. pl. 19.
Sertularia neritina, *Linn. Syst.* 1315; *D. Chiaje, Anim. s. Vert. Nap.* iv. 147; *Esper, Sert.* t. 13. fig. 1–3.
Cellularia neritina, *Pall. Elench.* 67; *Flem. Brit. Anim.* 539; *Johnst. Hist. Brit. Zooph.* ed. 2. 340. t. 60. figs. 3, 4.
Cellaria neritina, *Ellis and Soland. Zooph.* 22; *Lamk. Anim. s. Vert.* ed. 2. ii. 190 (ex var. B.), *Esper*, t. 13. figs. 1, 2, 3.
Bugula neritina, *Oken, Lehrb. Nat.* 89.
Acamarchis neritina, *Lamx. Cor. Flex.* 58. pl. 3. fig. 2; *Zooph.* 6; *Risso, L'Europ. Mérid.* v. 318; *Blainv. Dict. Sc. Nat.* lx. 423; *Man. Act.* 459. pl. 77. fig. 3; *Busk, Ann. Nat. Hist.* 2nd ser. vii. pl. 8. figs. 5, 6, 7.
Crisia neritina, *Lamx. Bull. Soc. Phil.* 1812, iii. 183.
Bugula neritina, *Gray, List of Brit. Rad.* 114.
*Hab.* Britain (Scarborough, *Bean*). New Zealand! *Hooker, Darwin, Lyall.* Auckland Islands! *Hooker.* Australia (ubique)! Rio de Janeiro! *Lyall.* America (North?), *Ellis.* Red Sea. Bay of Honduras.

Although very generally distributed throughout the globe, and perhaps more so than most of the Polyzoa, it appears extremely doubtful whether this species really belongs to the British Fauna. The only British specimen I have seen or been able to hear of, is that in Dr. Johnston's collection now in the British Museum, and found by Mr. Bean at Scarborough. The other forms included under the same name by Dr. Johnston, as well as those collected by Lieut. Thomas at Copinstra and off Tynemouth, all belong to *Cellularia peachii*: so that, unless the specimen mentioned by Dr. Fleming, as collected by Miss Blackburne on the coast of Cheshire, should really belong to *A. neritina*, it might be concluded that Mr. Bean's specimen was one accidentally introduced by some vessel from abroad.

2. Bugula flabellata. Pl. LI., LII.

Cells multiserial, oblong, truncate above with one or two spines at each upper angle. Aperture extending to the bottom. Avicularia on the sides of the cell capitate; surface smooth. Ovicells cucullate with a very wide opening.

Corallina cum appendiculis lateralibus avium capitum formâ, *Ellis, Corall.* pl. 38. fig. 7.
Cellularia Avicularia β, *Pallas, Elench.* 68.
Flustra avicularis, *Sow. Brit. Misc.* ii. 21. pl. 71; *Flem. Brit. Anim.* 506; *Johnst. Trans. Nat. Soc.* ii. 265; *Blainv. Dict.*

*Sci. Nat.* lx. 416; *Man. Act.* 451; *Couch. Zooph. Cornw.* 54; *Corn. Faun.* iii. 122; *Johnst. Hist. Brit. Zooph.* ed. 2. 346. t. 63. figs. 3, 4.
? Flustra angustiloba, *Lamk. Hist. Anim. s. Vert.* ed. 2. ii. 222.
Flustra capitata, *Hogg's Stock.* 36.
Crisia flustroides, *Lamour. Corall. Flex.* 141?
Avicularia flabellata, *J. V. Thompson, MSS. Brit. Mus.*; *Gray, List of Brit. Rad.* 106.
*Hab.* Britain. Seas of Europe.

3. BUGULA AVICULARIA. Pl. LIII.

Cells biserial, elongate, contracted below. Aperture not reaching quite to the bottom, obovate; above with two spines on the outer side and one on the inner. Avicularia on the side of the cell, capitate, surface granular or areolated. Ovicells superior, subglobular, opening small.

Bird's-head Coralline, *Ellis, Corall.* 36. no. 2. pl. 20. fig. *a*, A.
Cellularia avicularia, *Pall. Elench.* 68; *Johnst. Brit. Zooph.* 292. pl. 36. figs. 7, 8; *Couch, Zooph. Cornw.* 58; *Corn. Faun.* iii. 128; *Van Beneden, Recherch.* 41 & 48. pl. 6. figs. 1–8; *Johnst. Hist. Brit. Zooph.* ed. 2. 338. t. 63. figs. 7, 8.
Sertularia avicularia, *Linn. Syst.* 1315; *Berk. Syn.* i. 220.
Cellaria avicularia, *Ellis and Soland. Zooph.* 22; *Lamk. Anim. s. Vert.* ed. 2. ii. 191; *Johnst. Trans. Newc. Soc.* ii. 26.
Bugula avicularia, *Oken, Lehrb. Nat.* 90.
Crisia avicularia, *Lamx. Bull. Soc. Phil.* 1812. iii. 183; *Cor. Flex.* 141; *Templeton, Mag. Nat. Hist* ix. 468.
Cellularia avicularis, *Reid, Ann. & Mag. Nat. Hist.* xvi. 389.
*Hab.* Seas of Europe.

4. BUGULA PLUMOSA. Pl. LIV.

Cells elongated, much attenuated below. Aperture as wide as the cell above, elliptical below, with a short conical spine at the upper and outer angle. Avicularia capitate, affixed close to the outer margin of the aperture. Ovicell superior, globular.

Corallina pumila erecta ramosior, *Raii Syn.* i. 37. no. 20. t. 2. fig. 1; *Ellis, Phil. Trans. abridg.* x. 346. pl. 8. fig. *b*, B, D.
Soft-feathered Coralline, *Ellis, Corall.* 33. no. 1. pl. 18. fig. *a*, A.
Sertularia fastigiata, *Linn. Syst.* 1314; *Fabr. Faun. Grœnl.* 445; *Berk. Syn.* i. 219.
Cellularia plumosa, *Pall. Elench.* 66; *Couch, Corn. Faun.* iii. 128. pl. 23. fig. 4; *Johnst. Hist. Brit. Zooph.* ed. 2. 341. t. 61. figs. 1–5.
Cellularia fastigiata, *Blumenb. Man.* 273; *Flem. Brit. Anim.* 539.
Cellaria plumosa, *Ellis and Soland. Zooph.* 21; *Lamk. Anim. s. Vert.* ed. 2. ii. 190.

Crisia plumosa, *Lamour. Bull. Soc. Phil.* 1812, iii. 185; *Corall.* 62.
Crisia fastigiata, *Templeton, Ann. & Mag. Nat. Hist.* ix. 468.
Bicellaria plumosa, *Blainv. Dict. Sc. Nat.* lx. 424; *Act.* 459.
Crisularia plumosa, *Gray, Brit. Rad.* p. 111.
*Hab.* Britain.

5. BUGULA DENTATA. Pl. XXXV.

Cells biserial, oblong, rounded at each end. Aperture oval; three marginal spines on the outer side and one on the inner. Avicularia lateral, capitate. Ovicell superior, cucullate (colour blue).

Acamarchis tridentata, *Krauss, Zooph. d. Südsee*, p. 31. fig. 2.
Acamarchis dentata, *Lamx. Exp. Méth.* p. 6. tab. 5. fig. 1–3; *Hist. Pol. Flex.* p. 135. pl. 3. fig. 3.
Cellaria neritina, var. B., *Lamk.* ii. 191.
*Hab.* Australia. New Zealand, *Hooker, Lyall.* Tasmania, *Hooker.* South Africa.

Notwithstanding the difference in the number of spines on the outer edge of the aperture assigned to this species by Lamouroux and by Krauss, there can be little doubt but that they intend one and the same species. The statement made by Lamouroux, that his *A. dentata* is "d'une couleur plombée," is strongly confirmatory of this supposition.

6. BUGULA MURRAYANA. Pl. LIX.

Cells multiserial, elongated, contracted about the middle and downwards. Aperture oval, with two, three or four, incurved marginal spines on the outer edge and one on the inner. A strong, hollow, spinous process on each side of the top of the cell, and a capitate articulated avicularium on the front of some of the cells below the aperture.

Flustra Murrayana, *Bean, MSS.*; *Johnst. Hist. Brit. Zooph.* ed. 2. 347. t. 63. figs. 5, 6.
? Sertularia spiralis, *Olivi, Zool. Adriat.* 291. t. 6. f. 2.
Flabellaria spiralis, *Gray, List of Brit. Rad.* 106.
*Hab.* Britain (north and east).

## Fam. 9. FLUSTRADÆ.

Polyzoary flexible, expanded, foliaceous, erect, sometimes decumbent and loosely attached. Cells multiserial, quincuncial or irregular.

Flustra, *Linn.*; *Johnst. Brit. Zooph.* ed. 2. 342.
Flustradæ, *Gray, Cat. Brit. Rad. B. M.* 145, 1848 (part.).

Escharidæ (part.), *Johnst. Brit. Zooph.* ed. 1. 248, ed. 2. 263; *Gray, Syn. Brit. Mus.* 1842, 135.
Polypiers à réseau, *Lamk.* 2 ed. ii. 210 (part.).
Flustrées, *Lamx. Exp. Méth.* 2 (part.).

The principal distinctive character between the Flustradæ, as here intended, and the very closely allied group of the Membraniporidæ, consists in the more or less erect and free condition of the former. Since however, on the one hand, a *Flustra*, as is often the case in *Flustra foliacea*, may be decurrent at the base and spread to a considerable extent in the adnate form; and on the other, a *Membranipora*, as in the case of the so-called *Flustra membranacea* (*Membranipora flustroides*, mihi), is occasionally, as when spreading over *Flustra foliacea* for instance, nearly free, it would seem that this distinction is hardly sufficient to allow of their being regarded as belonging to two distinct families: the relationship, in other words, between the Flustradæ, as here constituted, and the genus *Membranipora*, is more that of family and subfamily. The latter genus might therefore almost be considered as the type of a subfamily, the Membraniporana. The distinction again between the Flustradæ and the Escharadæ on the one hand, and between *Membranipora* and *Lepralia* on the other, seems, in the former case at least, to be, if not wholly, at least in great part, artificial. The distinction drawn between the flexibility of the Flustradæ and the rigidity of the Escharadæ may perhaps be looked upon as artificial, but beyond this, the Escharadæ exhibit characters, principally in connexion with the avicularia, which would indicate a more natural distinction between the two groups. The distinction between *Membranipora* and *Lepralia* is in some respects greater and more natural, as will be indicated in speaking of those genera.

*Synopsis of Genera.*

1. Flustra.
2. Carbasea.
3. Diachoris.

### 1. Flustra.

Cells contiguous; on both sides of the frond.

Flustra, sp. *Linn.*
Flustra, *Lamk. Syst.* 1801; *Gray, Cat. Brit. Rad.* 145.

1. Flustra foliacea. Pl. LV. figs. 4, 5. Pl. LVI. fig. 5.

Cells arched and expanded above with two marginal spines on each side, contracted and truncate below. Avicularium and mandible semicircular.

Fucus marinus scruposus albidus telam sericeam textura sua æmulans, *Morris, Aist. Plant.* iii. 646. t. 8. f. 16 (bona).

Fucus telam lineam sericeamve textura sua æmulans. *Raii Syn.* 42. no. 9; *Jussieu, Mém. Acad. Roy. des Sc.* 1742, 298. pl. 10. f. 3.

Broad-leaved Hornwrack, *Ellis, Corall.* 70. no. 2. pl. 29. f. *a*, A, B, *b*.

Curious Sea-weed, *Hooke, Microg.* 140. pl. 9. f. 2, pl. 14. f. 1.

Eschara foliacea, *Linn. Syst.* ed. 10, 804; *Pall. Elench.* 52.

Flustra foliacea, *Linn. Syst.* 1300; *Müll Zool. Dan. Prod.* 253; *Ellis and Soland. Zooph.* 12. pl. 2. f. 8; *Esper, Pflanz. Flust.* t. 1. fs. 1, 2; *Van Beneden, Recherch.* 56. pl. 7. fs. 11, 17; *Berk. Syn.* i. 214; *Lamk. Anim. s. Vert.* ed. 2. ii. 219; *Grant, Edin. New Phil. Journ.* iii. 111, 337; *Flem. Brit. Anim.* 535; *Johnst. Trans. Newc. Soc.* ii. 263; *Mag. Nat. Hist.* iii. 483. f. 120; *Templeton, ibid.* ix. 469; *Risso, L'Europ. Mérid.* v. 333; *Blainv. Actinol.* 450. pl. 75. f. 1; *Couch, Zooph. Cornw.* 53; *Corn. Faun.* iii. 121. pl. 21. f. 1; *Johnst. Hist. Brit. Zooph.* ed. 2. 342. t. 62. fs. 1, 2; *Gray, List Brit. Rad.* 103.

*Hab.* Seas of Europe (universal). Society Islands, *E. Forbes.*

2. FLUSTRA PAPYRACEA. Pl. LV. figs. 6, 7.

Cells oblong, slightly enlarged upwards; a short marginal spine at each upper angle. Avicularia —— ?

Eschara papyracea utrinque cellifera, summitatibus securis acici instar truncatis, *Ellis, Corall.* pl. 38. f. 8.

Flustra papyracea, *Ellis and Soland. Zooph.* 13; *Flem. Brit. Anim.* 535; *Lister, Phil. Trans.* 1834, 384. pl. 12. f. 3; *Milne-Edwards, Lam. Anim. s. Vert.* ed. 2. ii. 220 (note 2); *Blainv. Dict. Sci. Nat.* lx. 451; *Lister, Phil. Trans.* 1834, pl. 12. f. 3.

F: chartacea, *Turt. Gmel.* iv. 663; *Turt. Brit. Faun.* 209; *Stew. Elem.* ii. 436; *Couch, Corn. Faun.* iii. 121; *Johnst. Hist. Brit. Zooph.* ed. 2. 343. t. 60. f. 5, 6; *Lamx. Pol. Flex.* 104; *Risso, Hist. Nat. de l'Europ. Mér.* v. 533.

Chartella papyracea, *Gray, List. Brit. Rad.* 104.

*Hab.* Britain (south?).

3. FLUSTRA TRUNCATA. Pl. LVIII. figs. 1, 2; & Pl. LVI. figs. 1, 2.

Cells linear, oblong, with an unarmed border. Avicularium elliptical, mandible semicircular.

Fucus marinus scruposus, *Raii Syn.* 42. no. 10; *Morris, Hist. Plant. Oxon.* iii. 546. t. 1. fig. 17 (opt.).

Narrow-leaved Hornwrack, *Ellis, Corall.* 69. no. 1. t. 28. fig. 1. *a*, A, B.

Porus cervinus minor, *Marsigli, Hist. Phys. de la Mer,* pl. 63. pl. 6. figs. 23, 24.
Eschara foliacea β, *Linn. Syst.* ed. 10. 804.
E. securifrons, *Pall. Elench.* 56.
Flustra truncata, *Linn. Syst.* 1300; *Müll. Zool. Dan. Prod.* 253; *Ellis and Soland. Zooph.* 11; *Berk. Syn.* i. 214; *Esper, Pflanz. Flust.* t. 3. figs. 1, 2; *Oliv. Zool. Adriat.* 274; *Lamk. Anim. s. Vert.* ed. 2. ii. 219; *Grant, loc. cit.* 111; *Flem. Brit. Anim.* 535; *Johnst. Trans. Newc. Soc.* ii. 264. pl. 12. fig. 1; *Templeton, Mag. Nat. Hist.* ix. 469; *Johnst. Hist. Brit. Zooph.* ed. 2. 344. t. 62. figs. 3, 4; *Blainv. Dict. Sci. Nat.* lx. 415.
Chartella securifrons, *Gray, List of Brit. Rad.* 104.
*Hab.* Britain (north and east chiefly). Australia!

4. FLUSTRA OCTODON. Pl. LVIII. fig. 5; & Pl. LVI. fig. 4.

Cells slender, pyriform, elongated, with three or four strong, hollow, pointed, incumbent, marginal denticles on each side, in the upper half of the cell. Avicularium oblong, mandible semicircular.

*Hab.* Coast of Spain, *M'Andrew.*

5. FLUSTRA DENTICULATA. Pl. LVI. fig. 7. & Pl. LVII.

Cells much elongated, nearly linear; a thick, hollow, upturned spine on each upper angle. Margin beset throughout the entire length of the cell with numerous thick, hollow, simple and blunt or bifurcate dentate processes, which arise from the front edge of the margin; sides of the cell immediately within the edge denticulate, with numerous minute, pointed denticles. Avicularia conical; mandible placed with its base oblique, point produced, acute.

*Hab.* Australia, *B. M.*

*Var. a.* (inermis). Pl. XLIX. figs. 3, 4.

Without the larger anterior teeth, or with but very few.

F. denticulata, *Busk, op. c.* i. 380.
*Hab.* Bass' Strait.

The very curious dentate processes on the edges of the cells render this species very conspicuous, but the total absence, or nearly so, of these external appendages in some instances renders the aspect of various specimens so different, that it requires some attention to perceive their identity. The peculiar form and position of the avicularium, and the presence of the internal or submarginal denticles, are the characteristic diagnostic marks.

### 2. Carbasea.

Cells contiguous; on one side only of the frond.

Flustra, sp. *Linn.*; *Johnst. Brit. Zooph.* 345.
Carbasea, *Gray, Cat. Brit. Rad.* 103, 117, 1848.

*a. Aperture occupying the entire front of the cell or very nearly so.*

1. Carbasea papyrea. Pl. L. fig. 1, 2, 3.

Cells oblong, narrowed and truncate below, convex, unarmed. Avicularia —— ? Ovicell —— ?

Porus cervinus, *Marsigl. Hist. Phys. de la Mer*, 64. pl. 6. figs. 25, 26.
Eschara papyrea, *Pall. Zooph.* 56.
Flustra Carbasea, *Ellis and Soland. Zooph.* 14. pl. 3. figs. 6, 7; *Turt. Gmel.* iv. 663; *Jameson, Wern. Mem.* i. 563; *Turt. Brit. Faun.* 209; *Stew. Elem.* ii. 436; *Lamk. Anim. s. Vert.* ed. 2. ii. 221; *Flem. Brit. Anim.* 535; *Grant, Edin. New Phil. Journ.* iii. 111; *Johnst. Trans. Newc. Soc.* ii. 264. pl. 9. fig. 4; *Templeton, ut sup. cit.* 469; *Roget, Bridgw. Treat.* i. 165. figs. 63, 64; & 172. figs. 69, 70; *Dalyell, Edin. New Phil. Journ.* xvii. 413; *Rep. Brit. Assoc.* 1834, 603; *Blainv. Dict. Sci. Nat.* lx. 415; *Johnst. Hist. Brit. Zooph.* ed. 2. p. 345. t. 63. figs. 1, 2.
Flustra papyracea, *Esper, Pflanz. Flust.* t. 2. figs. 1–3.
Carbasea papyracea, *Gray, List of Brit. Rad.* 103.
*Hab.* Britain (north and east).

2. Carbasea pisciformis. Pl. LV. figs. 1, 2; & Pl. LVI. fig. 6.

Cells, viewed behind, elongated, truncated at both ends, contracted at the waist; in front, pyriform, much expanded in the middle, contracted at top and tapering downwards, slightly expanding again at the end. Ovicells immersed, marked with radiating lines.

*Hab.* Tasmania, *B. M.*

3. Carbasea armata. Pl. XLIX. figs. 1, 2.

Cells, viewed behind, oblong, narrowed and truncate below; in front oval, with a projecting angle on each side about the middle. Marginal cells each with a large sessile avicularium on the outer side. Ovicell ——?

*Hab.* South Africa.

The peculiar character of this species, and by which it is readily distinguished from all others, consists in the presence upon each

of the marginal cells of a large sessile, well-formed avicularium. The frond attains a height of several inches, having linear truncate segments, slightly dilated towards the end, of a red-brown colour, generally with one or two dark spots. It appears to be very abundant in Algoa Bay.

In Krauss' 'Zooph. d. Süds.' p. 35, a new species of *Flustra*, or rather of *Carbasea*, is described under the name of *Flustra marginata*, of which figures are also given, minutely and highly finished. In general habit, and in the front view of the cells, there is not the slightest resemblance between this form and *Carbasea armata*; but what is given as the back view of the cell, in Krauss' figure very curiously, bears a striking resemblance to the front view in *C. armata*; and although, in the description of his species, Krauss takes no notice of the lateral avicularia, they are very clearly represented in this figure. It might therefore be supposed that Krauss has confounded two distinct species under his *F. marginata*.

4. CARBASEA CRIBRIFORMIS. Pl. LXVIII. fig. 1.

Cells oval, irregularly disposed. Frond reticulated. Ovicells cucullate, immersed.

Retepora cornea, *Busk, Voy. of Rattlesn.* i. 380.
*Hab.* Off Cumberland Island, 27 fathoms.

The peculiar reticulated frond of this species is so different from that of any other of its congeners, as at once to distinguish it. This form shows very strikingly how artificial some of the generic distinctions in this class of Polyzoa are; for, except in the flexible, horny consistence of the frond, there is no distinction between *C. reticulata* and a Retepore.

*β. Aperture occupying only part of the front of the cell.*

5. CARBASEA DISSIMILIS. Pl. L. figs. 4, 5, 6, 7.

Cells pyriform, much attenuated below. Aperture oval, anterior. Marginal cells with an acute, short, spinous process above on the outer side. A sessile projecting avicularium in front of each cell below the aperture.

F. carbasea, var. *β.*, *Lamk. Ann. s. V.* ii. 221. ii. 2d ed.
*Hab.* Tasmania, *Hooker*.

This species indicates the transition between the Flustradæ and Cellulariadæ. In the form especially of the outer cells, and in the presence of anterior avicularia upon most of them, it resembles *Menipea*. The continuous polyzoary however, and the frondose habit, are sufficient to indicate its true position.

6. CARBASEA EPISCOPALIS. Pl. XLVIII. figs. 1, 2; & Pl. LV. fig. 3.

Cells pyriform, cylindrical or barrel-shaped, back marked with transverse rugæ. Aperture circular superior. Ovicells lofty, keeled. Avicularia 0.

F. pyriformis? *Lamx. Pol. Flex.* 103. pl. 1. fig. 4; *Blainville, Man. d'Act.* 451; *Lamk. An. s. Vert.* ii. 221; *Busk, Voy. of Rattlesn.* i. 379.

*Hab.* Bass' Strait, 45 fathoms.

Sometimes small and parasitic, upon Sertularians and Polyzoa; sometimes independent, then of large growth, forming dichotomously divided fronds, with strap-shaped, truncate, unequal segments. From its general resemblance to Lamouroux's figure, it is not improbable that this may be his *F. pyriformis*; but as it is impossible to determine this with certainty, either from his figure or description, (which are equally applicable to several other species,) it has been thought better to give it a new designation. The one employed is suggested by the form of the ovicells, which bear a close resemblance to a bishop's mitre.

7. CARBASEA BOMBYCINA. Pl. XLVIII. figs. 4, 5, 6, 7.

Cells pyriform, cylindrical, smooth. Aperture small, circular, superior; a lunate pore in the front of the cell a short distance below the aperture; one to four perforations, in a series on either side of the cell, above and in front. Ovicell marked with radiating lines. Avicularia 0.

? F. bombycina, *Ellis and Soland. Zooph.* 14. pl. 4. fig. B; *Linn. Syst. Nat.* ed. 13. 3828. no. 9; *Bosc. Vers*, 117; *Lamx. Hist. Pol. Flex.* 103. no. 196; *Exp. Méth.* 3. t. 4. fig. B; *Lamk. Ann. s. V.* ii. 220. 2nd ed.; *Krauss, Z. d. Südsee*, 35.

*Hab.* Algoa Bay, Mossel Bay, South Africa.

The figure of *F. bombycina*, given by Ellis and Solander, bears a sufficiently near general resemblance to the species here designated *C. bombycina*, to render it probable that they may be identical, though this is by no means certain. Considering the locality whence the present species is derived, it may not perhaps be unlikely that it represents that intended by Ellis, when he says (speaking of his *F. bombycina*, which came from the Bahama Islands), "I have some elegant specimens from the East Indies that approach very near to this kind."

8. CARBASEA OVOIDEA. Pl. XLIX. figs. 5, 6, 7.

Cells elongated, slightly contracted below. Aperture oval, two-

thirds the length of the cell, velum very convex. Ovicell ——? Avicularium 0.

*Hab.* S. Patagonia, *Darwin.*

Margin of frond divided by shallow notches into small rounded lobes. The specific name is derived from the regularly oval form of the aperture, which is filled in by a very convex transparent velum.

9. CARBASEA ELEGANS. Pl. LIV. figs. 6, 7; & Pl. LVI. fig. 3.

Cells oblong. Aperture nearly as long as the cell, truncate or square below. Surface behind smooth. Ovicell ——? Avicularium 0.

*Hab.* Tasmania.

The cells in this species most nearly resemble those of *Flustra papyracea*: they are however less linear and more rounded at the top, and not so long in proportion to their width. The little filling-in of the aperture at bottom affords a distinctive character, as does the absence of avicularia, were the generic difference between the two overlooked.

10. CARBASEA INDIVISA. Pl. LVIII. figs. 3, 4.

Frond semicircular, undivided, subplicated; cells oblong, surface behind granulated. Ovicells ——? Avicularia 0.

*Hab.* New Zealand, *Hooker.*

### 3. DIACHORIS.

Cells disjunct, each connected with six others by tubular processes; frond sometimes partially adnate and decumbent.

Diachoris, *Busk, Voy. of Rattlesn.* 382.

The mode of arrangement and interconnexion of the cells in this genus is remarkable and highly interesting. It represents, in fact, a dissected *Flustra*. The cells are disposed in linear parallel series, and those of two contiguous series are alternate with respect to each other. Each cell is connected with one at either end in the same linear series by a rather wide, short tubular prolongation, and with two on each side in the contiguous series by narrower tubes; so that each cell, except in the marginal rows, is connected with six others. The species, though stated to be loosely adnate, are also capable of rising into independent erect fronds, like the other Flustradæ, and in the other form would be more correctly described as decumbent than adnate, as they are very loosely connected to the foreign base upon which they lie.

1. DIACHORIS CROTALI. Pl. LXVI. figs. 1, 2.

Cells erect, open in front, with straight sides; perforated on the sides and bottom; a lanceolate appendage articulated to each upper angle. Ovicell small, conical, superior.

Diachoris crotali, *Busk, Voy. of Rattlesn.* 382. tab. i. figs. 10, 12. *Hab.* Bass' Strait.

The frond, although, as explained above, not strictly adnate, as it seems to have no attachments, is usually spread loosely over other Polyzoa. There is no appearance of a moveable mandible in the lanceolate appendages, which nevertheless most probably represent avicularia. These organs are of a lanceolate form, with an elevated ridge or keel along the back, and slightly concave beneath: they project in front, slightly depending, and at the base of each is a rounded eminence.

2. DIACHORIS MAGELLANICA. Pl. LXVII.

Cells semi-erect, open in front, oval; mouth circular with a thickened and raised margin. A pedunculate and articulated, capitate avicularium attached to the margin of the cell near the top on each side. Ovicell ——?. (Frondose, with cells on both sides, and also loosely adnate.)

*Hab.* Straits of Magellan, *Darwin*; New Zealand, *Lyall.*

3. DIACHORIS INERMIS. Pl. LXXII.

Cells decumbent, boat-shaped, entirely open; two short marginal spines on each side near the top. Ovicell ——? Avicularium ——?

*Hab.* New Zealand, *Lyall.* Straits of Magellan, *Darwin.*

This species approaches very nearly to a *Membranipora*, and from the total absence of any moveable appendages, might perhaps be regarded as a type of a distinct genus: as, however, it is a solitary instance of the form, and agrees in the structure of the polyzoary with the above two species, it has been associated with them and not with the Membraniporidæ.

# DESCRIPTION OF PLATES.

PLATE

I. Fig. 1, Catenicella lorica, p. 6, *natural size*; fig. 2, *front*; fig. 3. *back*.

II. Fig. 1. Catenicella ventricosa, p. 7, *front*; fig. 2, *back*.
Fig. 3. Catenicella hastata, p. 7, *front*; fig. 4, *back*.

III. Fig. 1. Catenicella ventricosa, p. 7, (*var.*) *front*; fig. 2, *back*; fig. 3, *ovicell*.
Fig. 4. Catenicella ventricosa, p. 7, (*var. maculata*) *front*; fig. 5, *back*.

IV. Fig. 1. Catenicella aurita, p. 8, *front*; fig. 2, *back*; fig. 3, *ovicell*.
Fig. 4. Catenicella amphora, p. 8, *front*; fig. 5, *back*.

V. Fig. 1. Catenicella plagiostoma, p. 8, *front*; fig. 2, *back*.
Fig. 3. Catenicella cribraria, *front*; fig. 4, *back*.

VI. Fig. 1. Catenicella margaritacea, p. 9, *front*; fig. 2, *side view*; fig. 3, *back*.
Fig. 4. Catenicella carinata, p. 12, *front*; fig. 5, *ovicell*; fig. 6, *side view*.

VII. Fig. 1. Catenicella formosa, p. 9, *front*; fig. 2, *back*.
Fig. 3. Catenicella gibbosa, p. 12, *front*; fig. 4, *back*.

VIII. Fig. 1. Catenicella perforata, p. 10, *front*; fig. 2, *back and side views*.
Fig. 3. Catenicella ringens, p. 10, *front*; fig. 4, *back*.

PLATE

IX. Fig. 1. Catenicella elegans, p. 10 (*var.* South Africa), *front*; fig. 2, *back*; fig. 3 (*var.* Australia), *front*; fig. 4, *back*.

X. Fig. 1. Catenicella cornuta, p. 11, *front*; fig. 2, *back*; fig. 3, *side view*.
Fig. 4. Catenicella umbonata, p. 11, *front*; fig. 5, *back*.

XI. Fig. 1. Catenicella taurina, p. 12, *front*; fig. 2, *back*; fig. 3, *with ovicells*; fig. 4, *spines replaced by avicularia*.

XII. Fig. 1. Calpidium ornatum, p. 15, *natural size*; fig. 2, *front*.

XIII. Fig. 1. Calpidium ornatum, p. 15, *front view of bifurcation*; fig. 2, *back of cell*.

XIV. Fig. 1. Alysidium lafontii, p. 14, *front of cell*; fig. 2, *side view, showing the avicularium*; fig. 3, *back*; fig. 4. *back, at a bifurcation*; fig. 5, *natural size*.
Fig. 6. Alysidium parasiticum, p. 14, *front, with an ovicell*; fig. 7, *back*; fig. 8, *side view*; fig. 9, *natural size*.

XV. Fig. 1. Ætea anguina, p. 31.
Fig. 2. Ætea dilatata, p. 31.

XVI. Fig. 1. Beania australis, p. 32; fig. 2, *portion of cell to show the lateral processes*; fig. 3, *a more highly magnified view of the costæ*.
Fig. 4. Caberea boryi, p. 38, *front*; fig. 5, *back*.

XVII. Fig. 1. Hippothoa patagonica, p. 30.
Fig. 2. Scruparia chelata, p. 29.

XVIII. Fig. 1, 2. Hippothoa catenularia, p. 29.
Fig. 3, 4. Hippothoa divaricata, p. 30.

XIX. Fig. 1. Menipea fuegensis, p. 21, *front view*; fig. 2, *back view*; fig. 3, *larger view of mouth of cell with the avicularium*.

XX. Fig. 1. Menipea cirrata, p. 21, *front*; fig. 2, *back*.
Fig. 3, 5. Menipea ternata, p. 21, *front*; fig. 4, *back*.

PLATE

XXI. Fig. 1. Scrupocellaria scrupea, p. 24, *front*; fig. 2, *back*.
Fig. 3. Canda reptans, p. 26, *front*; fig. 4, *back*.

XXII. Fig. 1. Scrupocellaria ferox, p. 25, *front*; fig. 2, *back*; fig. 5, *ovicell*.
Fig. 3. Scrupocellaria scruposa, p. 25, *back*; fig. 4, *front*.

XXIII. Fig. 1. Menipea patagonica, p. 22, *mode of origin*.
Fig. 2. Menipea triseriata, p. 22, *front*; fig. 3, *back*; fig. 4, *ovicells*.

XXIV. Fig. 1. Scrupocellaria macandrei, p. 24, *front*; fig. 2, *back*; fig. 3, *radical tube*.
Fig. 4. Beania mirabilis, p. 32, *side view of cell*; fig. 5, *enlarged view of costæ*.

XXV. Fig. 1. Menipea patagonica, p. 22, *front*; fig. 2, 3, *back*.

XXVI. Fig. 1, 2. Menipea patagonica, p. 22, *variety*.
Fig. 3. Cellularia ornata, p. 20, *front*; fig. 4, *back*.

XXVII. Fig. 1. Cellularia cuspidata, p. 19, *front*; fig. 2, *back*.
Fig. 3. Cellularia peachii, p. 20, *front*; fig. 4, *back*; fig. 5, *ovicell*.

XXVIII. Fig. 1. Scrupocellaria diadema, p. 24, *front*; fig. 2, *back*; fig. 3, *ovicell*.
Fig. 4. Scrupocellaria cyclostoma, p. 24, *front*; fig. 5, *back*.

XXIX. Fig. 1. Dimetopia spicata, p. 35.
Fig. 2. Dimetopia cornuta, p. 35; fig. 3, *ovicell*.

XXX. Fig. 1. Halophila johnstoniæ, p. 43, *natural size*; fig. 2, *back*; fig. 3, *front*.

XXXI. Fig. 1. Bicellaria tuba, p. 42, *front*; fig. 2, *back, with avicularium*; fig. 3, *occasional mode of connexion of cells*; fig. 4, *ovicell*.

XXXII. Fig. 1. Bicellaria gracilis, p. 42, *natural size*; figs. 2, 4, *front*; figs. 3, 5, *back*.

XXXIII. Fig. 1. Canda arachnoides, p. 26, *natural size*; figs. 2, 4, *front*; fig. 3, *back*; fig. 5, *avicularia at the lower part of a branch*.

PLATE

XXXIV. Fig. 1. Bicellaria ciliata, p. 41, *natural size*; fig. 2, *front*; fig. 3, *back*; fig. 4, *ovicells*; fig. 5, *avicularia*.

XXXV. Fig. 1. Bugula dentata, p. 46, *natural size*; fig. 2, *front*; fig. 3, *back*; fig. 4, *side*; fig. 5, *avicularia*.

XXXVI. Fig. 1. Amastigia nuda, p. 40, *natural size*; figs. 2, 3, *front*; fig. 4, *back*; fig. 5, *dorsal avicularium*.

XXXVII. Fig. 1. Caberea hookeri, p. 39, *natural size*; fig. 2, *front*; fig. 3, *back*.

XXXVIII. Fig. 1. Caberea boryi, p. 38, *natural size*; fig. 2, *front*; fig. 3, *back*; figs. 4, 5, *side*; figs. 6, 7, *younger cells*.

XXXIX. Fig. 1. Didymia simplex, p. 35, *natural size*; fig. 2, *front*; fig. 3, *front with ovicell*.

XL. Fig. 1. Emma crystallina, p. 28, *natural size*; fig. 2, *front*; fig. 3, *back*.

XLI. Fig. 1. Emma tricellata, p. 28, *front*; fig. 2, *back*.

XLII. Ætea ligulata, p. 31.

XLIII. Fig. 1. Bugula neritina, p. 43, *natural size*; fig. 2, *front*; figs. 3, 4, *back*; figs. 5, 6, *ovicells*.

XLIV. Fig. 1. Bicellaria grandis, p. 42, *natural size*; fig. 2, *front*; fig. 3, *back*.

XLV. Fig. 1. Notamia bursaria, p. 36, *natural size*; fig. 2, *front*; fig. 3, *back*; fig. 4, Diagram to represent the mode of connexion of the cells.
Fig. 5. Gemellaria loricata, p. 34, *natural size*; fig. 6, *back and side*.

XLVI. Fig. 1. Caberea rudis, p. 38, *natural size*; fig. 2, *front*; fig. 3, *back*.

XLVII. Fig. 1. Caberea lata, p. 39, *natural size*; fig. 2, *front*; fig. 3, *back*.

XLVIII. Fig. 1. Carbasea episcopalis, p. 52, *natural size*; fig. 2, *front*; fig. 3, *back*.

PLATE

XLVIII. Fig. 4. Carbasea bombycina, p. 52, *natural size*; fig. 5, *front*; fig. 6, *back*; fig. 7, *ovicells*.

XLIX. Fig. 1. Carbasea armata, p. 50, *natural size*; fig. 2, *front*.
Fig. 3. Flustra denticulata (var. *inermis*), p. 49, *natural size*; fig. 4, *magnified*.
Fig. 5. Carbasea ovoidea, p. 52, *natural size*; fig. 6, *front*; fig. 7, *back*.

L. Fig. 1. Carbasea papyrea, p. 52, *natural size*; fig. 2, *front*; fig. 3, *back*.
Fig. 4. Carbasea dissimilis, p. 51, *natural size*; fig. 5, *front*; fig. 6, *back*; fig. 7, *avicularium*.

LI. Fig. 1. Bugula flabellata, p. 44, *natural size*; fig. 2, *front*; fig. 3, *avicularium* (more magnified).

LII. Bugula flabellata, p. 44, *back*.

LIII. Fig. 1. Bugula avicularia, p. 45, *natural size*; fig. 2, *front*; fig. 3, *back*; fig. 4, *avicularium*.

LIV. Fig. 1. Bugula plumosa, p. 45, *natural size*; fig. 2, *front*; fig. 3, *back*; fig. 4, *ovicell*; fig. 5, *avicularium*.
Fig. 6. Carbasea elegans, p. 53, *front*; fig. 7, *back*.

LV. Fig. 1. Carbasea pisciformis, p. 50, *front*; fig. 2, *back*.
Fig. 3. Carbasea episcopalis, p. 52, *front* (without ovicells).
Figs. 4, 5. Flustra foliacea, p. 47.
Figs. 6, 7. Flustra papyracea, p. 48.

LVI. Figs. 1, 2. Flustra truncata, p. 48.
Fig. 3. Carbasea elegans, p. 53.
Fig. 4. Flustra octodon, p. 49.
Fig. 5. Flustra foliacea, p. 47.
Fig. 6. Carbasea pisciformis, p. 50.
Fig. 7. Flustra denticulata, p. 49.

LVII. Fig. 1. Flustra denticulata, p. 49, *portion of frond*; fig. 2, *a single cell with avicularium more highly magnified*.

LVIII. Figs. 1, 2. Flustra truncata, p. 48.
Fig. 3. Carbasea indivisa, p. 53, *front*; fig. 4, *back*.
Fig. 5. Flustra octodon, p. 48.
Fig. 6. Membranipora telacea. Vid. Part II.

PLATE

LIX. Fig. 1. Bugula murrayana, p. 46, *front*; fig. 2, *back*.

LX. Fig. 1. Menipea multiseriata, p. 22, *front*; fig. 2, *back*.

LXI. Fig. 1. Membranipora lineata,. Vid. Part II.
Fig. 2. Membranipora membranacea. Vid. Part II.

LXII. Fig. 1. Scrupocellaria cervicornis, p. 24, *front*; fig. 2, *back*; fig. 3, *pedunculate operculum*; fig. 4, *marginal spines*.

LXIII. Figs. 1, 2. Salicornaria malvinensis, p. 18.
Fig. 3. Salicornaria gracilis, p. 17.
Fig. 4. Salicornaria tenuirostris, p. 17.
Fig. 5. Salicornaria teuuirostris, *var. a*, p. 17.

LXIV. Fig. 1–3. Salicornaria farciminoides, p. 16.
Fig. 2. *Var.* (sinuosa).
Figs. 4, 5. Farciminaria aculeata, p. 33.
Fig. 6. Nellia oculata, p. 18.

LXV. Fig. 1. Nellia simplex, p. 19.
Fig. 2. Vincularia ornata.
Fig. 3. Membranipora cyclops.
Fig. 4. Membranipora grandis.
Fig. 5. Membranipora galeata.
Fig. 6. Membranipora rozieri.
} Vid. Part II.

LXV.(*). Fig. 1. Salicornaria malvinensis, p. 18, *natural size*.
Fig. 2. Salicornaria gracilis, p. 17, *natural size*.
Fig. 3. Nellia simplex, p. 19, *natural size*.
Fig. 4. Nellia oculata, p. 18, *natural size*.
Fig. 5. Salicornaria farciminoides, p. 16, *natural size*.
Fig. 6. Farciminaria aculeata, p. 33, *natural size*.
Fig. 7. Farciminaria flexilis, *natural size*. Vid. Part II.

LXVI. Fig. 1. Diachoris crotali, p. 54, *front*; fig. 2, *back*; fig. 3, *side* (*reduced*).

LXVII. Fig. 1. Diachoris magellanica, p. 54, *front*; fig. 2, *back*; fig. 3, *side*.

LXVIII. Fig. 1. Carbasea cribriformis, p. 51.
Fig. 2. Membranipora telacea. *Vid.* Part II.

N.B. The present Part contains about one-half of the Cheilostomatous suborder, the remainder of which will be included in a second. Owing to the rapid accumulation of materials during the progress of the Work, it has not been possible to adhere to any regular sequence in the Plates, and it has been found necessary to reserve one Plate (LXXII.), containing the figures of *Diachoris inermis*, for the ensuing part of the Catalogue: for the same reason also the figures of several species of *Membranipora* and of a species of *Vincularia*, to be afterwards described, appear in Plates LVIII., LXI., LXV. and LXVIII. G. B.

ROYAL ASIATIC SOCIETY LIBRARY OF THE BOMBAY BRANCH

Fig. 1.

Fig. 2.

Fig. 3.

Catenicella lorica.

Fig. 1

Fig. 2.

C. ventricosa.

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Fig. 3.

Fig 4

C. hastata

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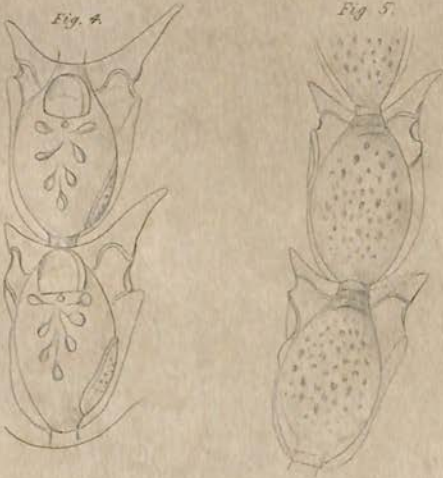
Fig 1. Fig 2. Fig 3.

C. ventricosa. (var.)

Fig 4. Fig 5.



C. ventricosa. (var *maculata*)

G. BUSK DEL. Ramsay & Muskett imp. ACHILLES LITH.

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Fig. 1

Fig. 2

Fig. 3.

C aurita.

Fig. 4.

Fig. 5

C amphora

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ROYAL ASIATIC SOCIETY LIBRARY OF THE BOMBAY BRANCH

Fig. 1

Fig. 2

C. plagiostoma

Fig. 3

Fig. 4

C. cribraria

C. RUSK DEL. Printed by Rosser & Nicholls ACHILLES LITH.

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ASIATIC



Fig. 1.

Fig. 3.

Fig. 2.

C. margaritacea

Fig. 4.

Fig. 6.

Fig. 5.

C. carinata

W. BURK, Del. Printed by Evans & Nichols ACHILLES, LITH.

Fig. 1.

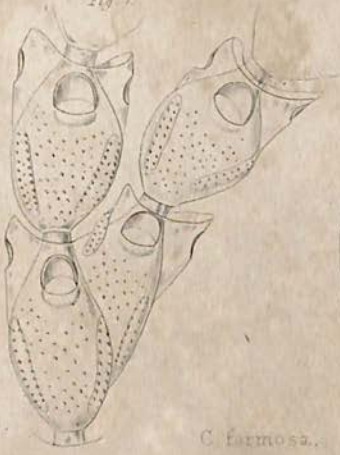

Fig. 2.

C. formosa.

LIBRARY

Fig. 3.

Fig. 4.

C. gibbosa.

Fig 1.

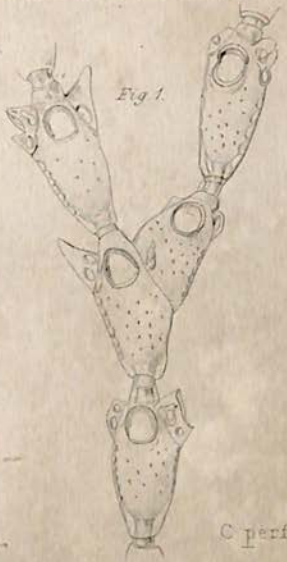

Fig 2.

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ASIATIC

C perforata.

Fig 3

Fig 4.

C ringens

0.1 Inch.

ROYAL ASIATIC SOCIETY



Fig 1.

Fig 2.

C. elegans.
(S Africa.)

Fig 3.

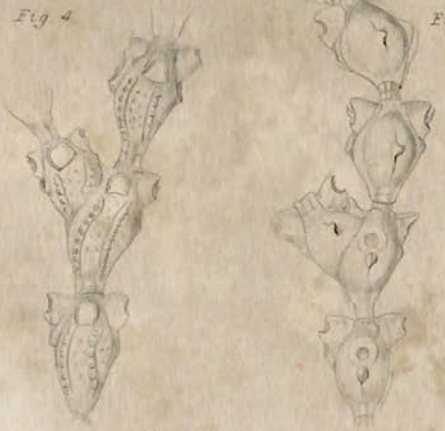
Fig 4.

C elegans (Australia)

Obt Inch.

ROYAL ASIATIC SOCIETY LIBRARY BOMBAY BRANCH

C. cornuta.




C. umbonata.

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Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

C. taurina.

Gouch del. Barre & Michels, imp. Achilles Leyme.

Fig. 1

Natural size

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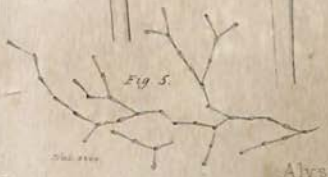
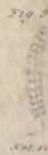
Fig. 2

Calpidium ornatum.

Calpidium ornatum




Alysidium Lafontii.



Alysidium parasiticum.

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OF THE
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Fig 1

Anguinaria spatulata

Anguinaria dilatata

BURN. DEL. ACHILLES DEB.

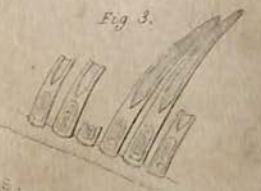
ROYAL ASIATIC SOCIETY LIBRARY OF THE BOMBAY BRANCH OF THE



Fig 1

Fig. 2

Fig. 3.



Beania australis.

Fig. 4

Fig. 5.

Cabera zelanica.

G. BUSK, DEL.

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ASIATIC SOCIETY

Fig. 1.

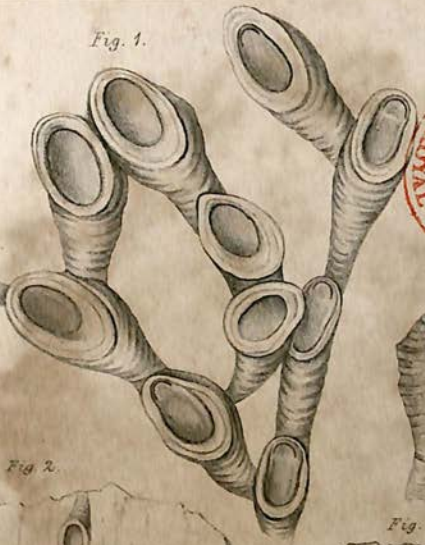

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Fig 4.

Fig 2.

Fig. 3.

Hippothoa carinularia

Hippothoa dubia

Fig. 2.

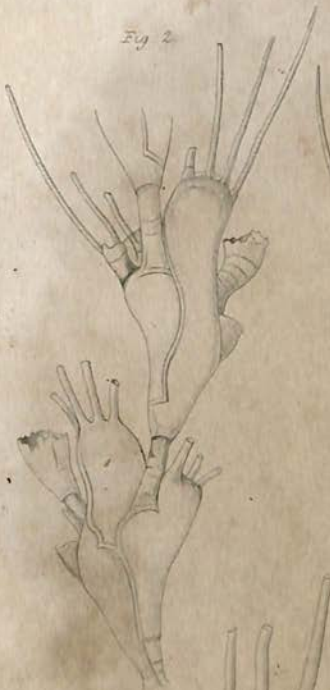


Fig. 1.

Fig. 3.

Merupea purpurea.

G. BUSK, DEL. ACHILLES, LITH.

Fig. 1

Fig. 2

Mempea cirrata.

Fig. 3

Fig. 5

Fig. 4

Mempea tuberata.

LIBRARY

Fig. 1.

Fig. 2.

Scrupocellaria scrupea

Fig. 3.

Cellula Septaria

Fig. 1

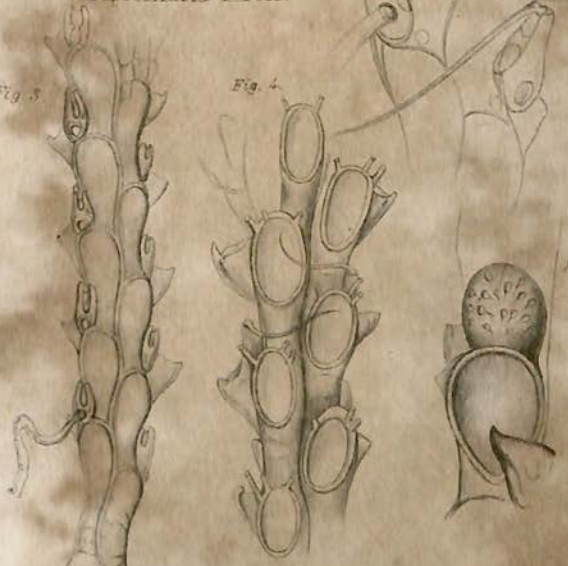
Fig. 2

Scrupocellaria ferox.

Fig. 3

Fig. 4

Fig. 5



Scrupocellaria scruposa.

G. BRYAN DEL. A. WILLIS LITH.

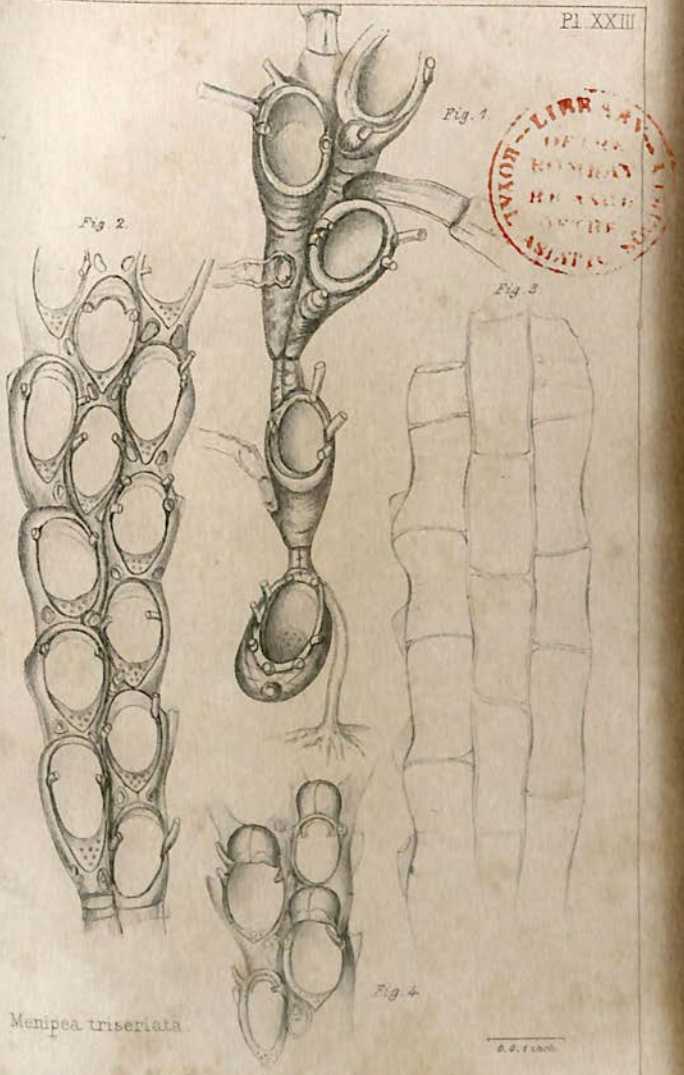


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Menipea triseriata.

ROYAL ASIATIC SOCIETY — LIBRARY OF THE BOMBAY BRANCH

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Fig. 1

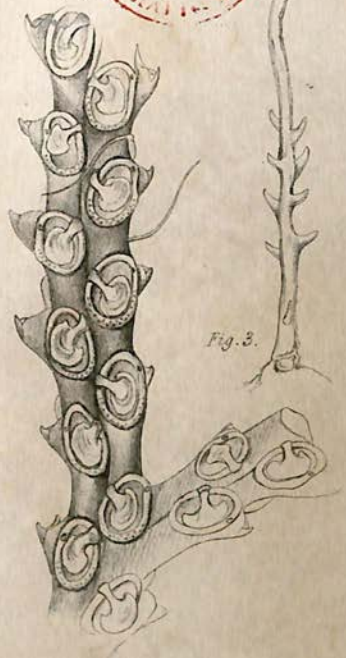

Fig. 3.

Fig. 2.

Scrupocellaria macandrei.

Fig. 4

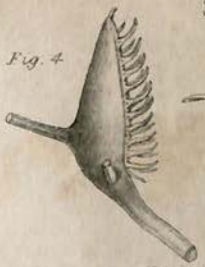

Fig. 5.

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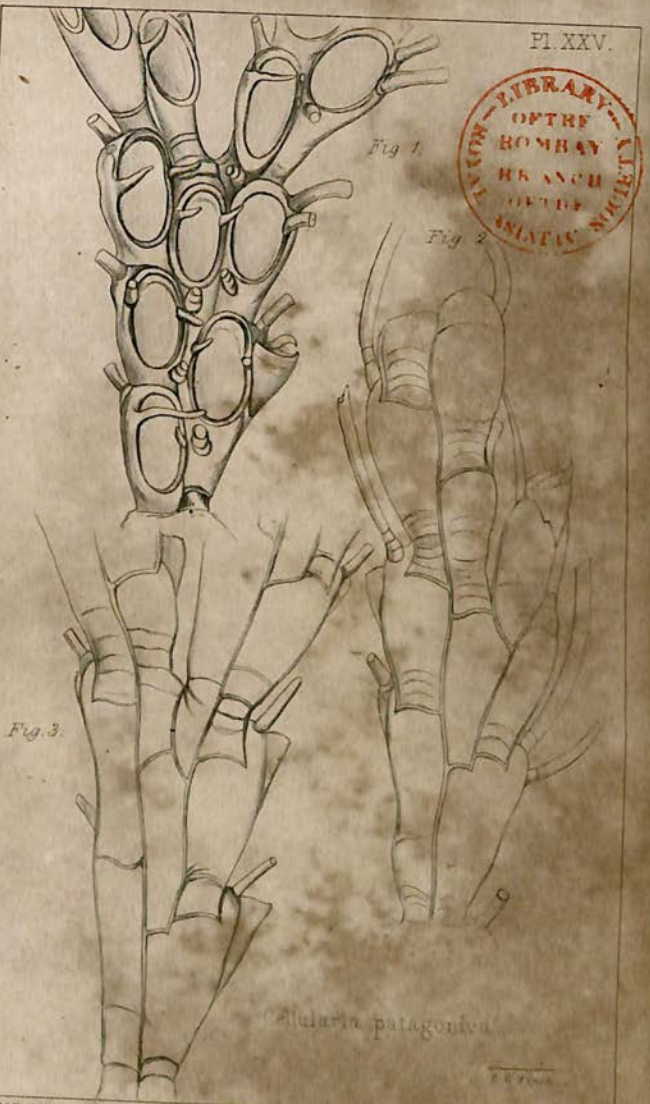
Beania mirabilis?

ROYAL ASIATIC SOCIETY — LIBRARY — BOMBAY BRANCH




Flustra patagonica

G. BUSK. DEL.

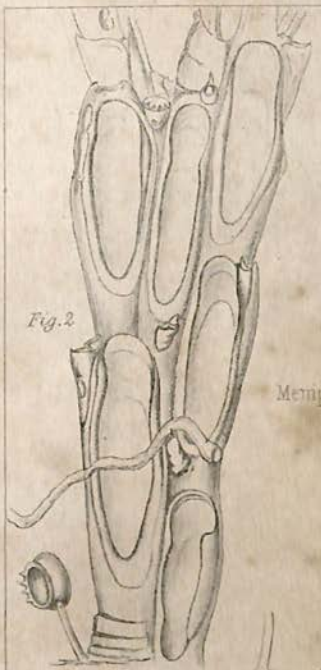


Fig.2

Fig.1

ROYAL ASIATIC SOCIETY LIBRARY OF THE BOMBAY BRANCH OF THE

Mempea patagonica.

Fig.3

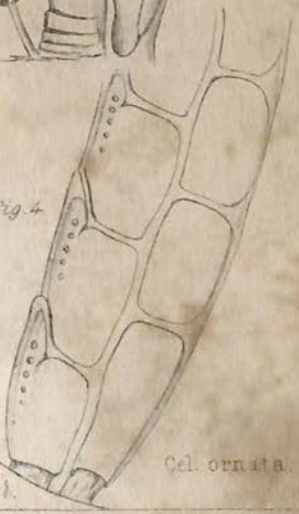
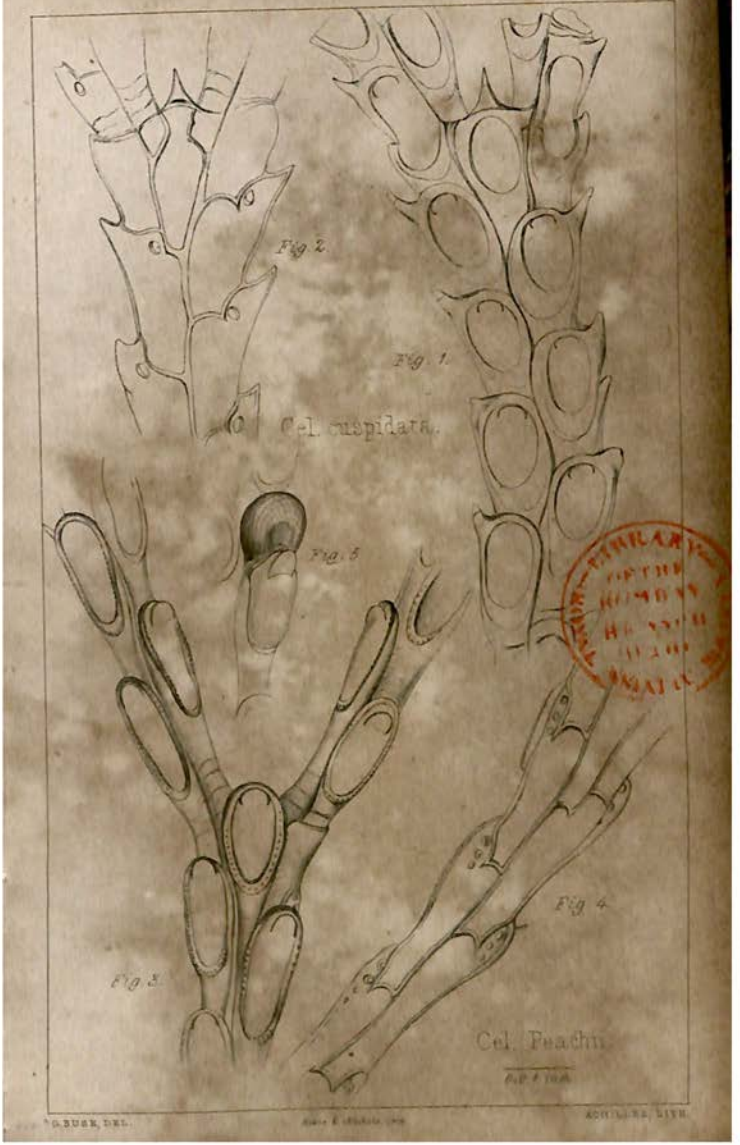


Fig.4

Cal. ornata.

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ROYAL ASIATIC SOCIETY OF THE BOMBAY BRANCH

Fig 1

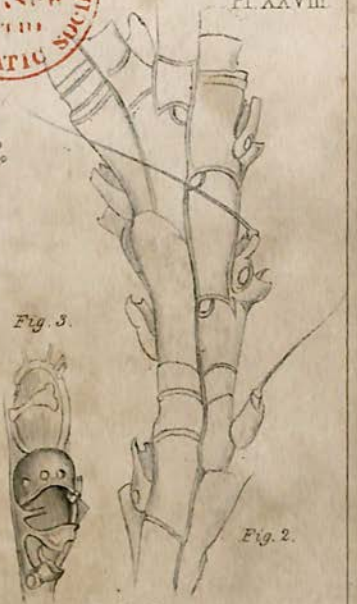

Fig. 2.



Fig. 3.

Scrupocellaria diadema.

Fig 4

Fig. 5.

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Fig. 1.

Fig. 2.

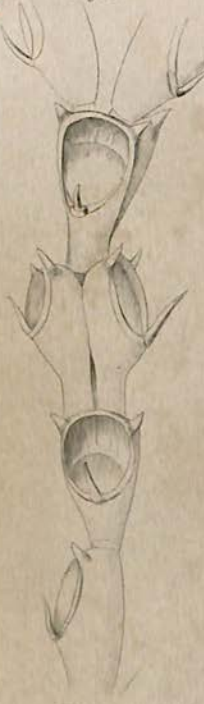

Fig 3

Fig 1. Dinetopia spinata.
" 2 } D. cornuta
" 3 }

0.0.1 Inch

G. BURN. DEL.

ACHILLES LITH.

ROYAL ASIATIC SOCIETY
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Fig 1

Fig 2

Fig 3

BICELLARIA JOHNSTONIÆ.

Pl. XXXI.

Fig 1.

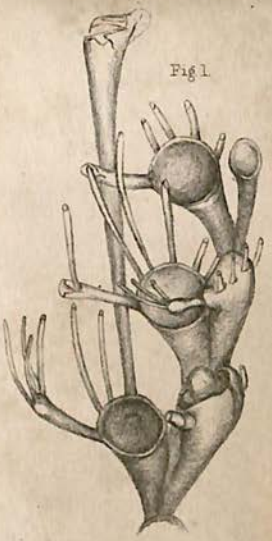

Fig 2.

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Fig 3.

Fig 4.

BICELLARIA TUBA.

ROYAL BOTANIC SOCIETY OF THE BOTANIC GARDEN

PL XXXV.

ROYAL ASIATIC SOCIETY LIBRARY OF THE BOMBAY BRANCH OF THE

ACAMARCHIS TRIDENTATA

G.B. del. et lith.

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CABERÉA NULA

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Fig. 3.

Fig. 1.

Fig. 2.

CABERERA HOOKERI

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CABRERA PATAGONICA

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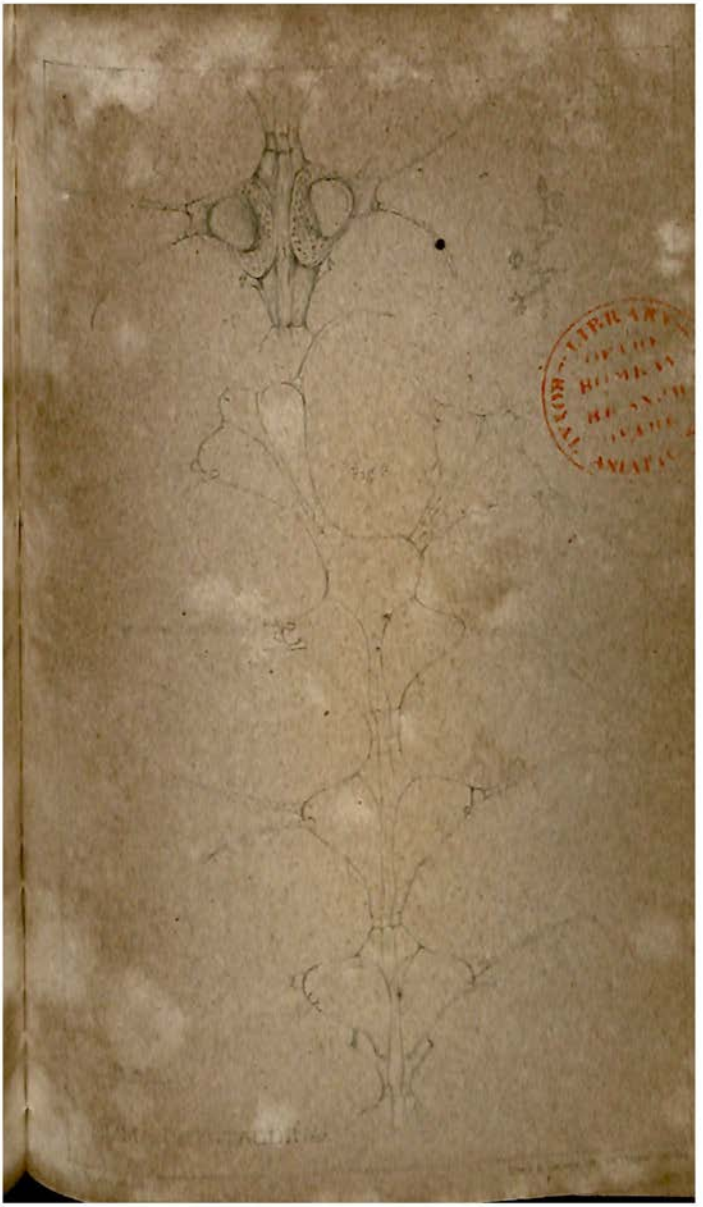
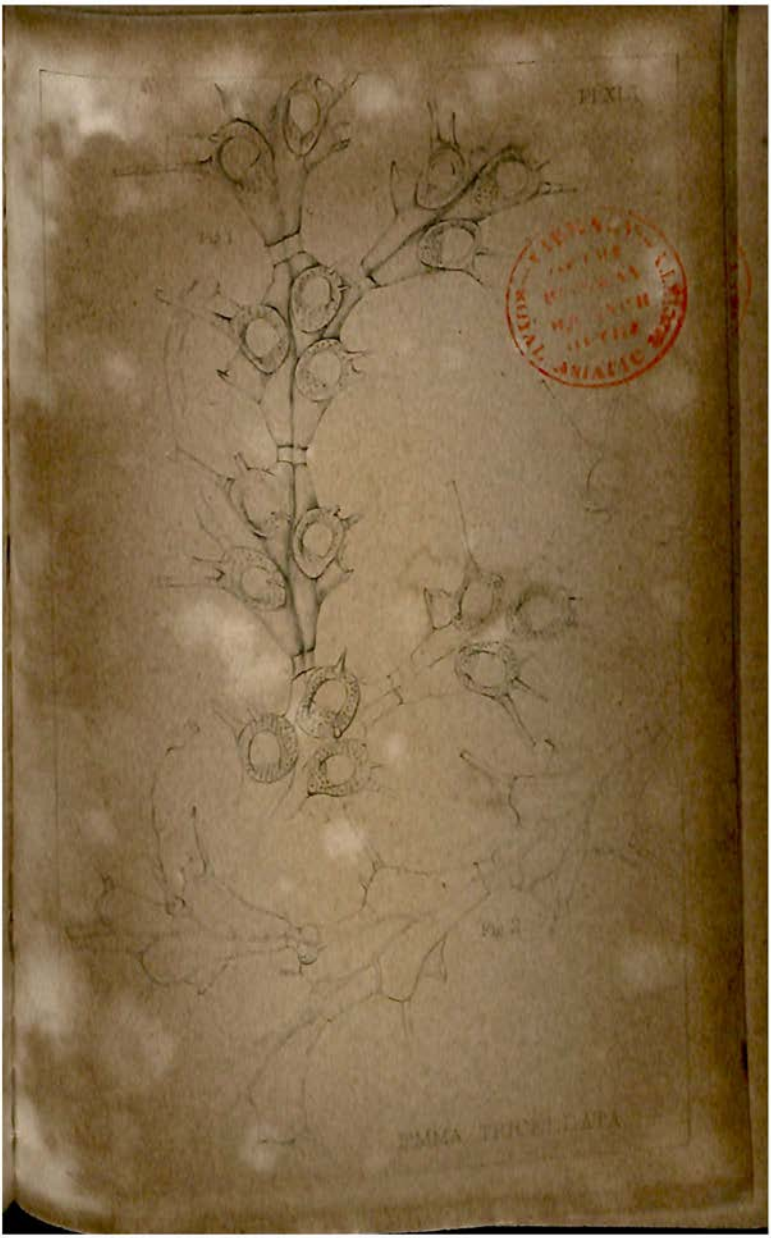
Fig 2

Fig 1

Fig 3

DIDYMIA SIMPLEX





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Pl. XLIV
Fig 2
Fig 3
Fig 1
ROYAL ASIATIC SOCIETY
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OF THE
BOMBAY
BRANCH
OF THE

Pl XLV

Fig 2

Fig 1

Fig 3

NOTAMIA BURSARIA

Fig 6

Fig 4

Fig 5

GEMELGARIA LORICULATA

ROYAL ASIATIC

Fig 1

Fig 2.

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Fig 3.

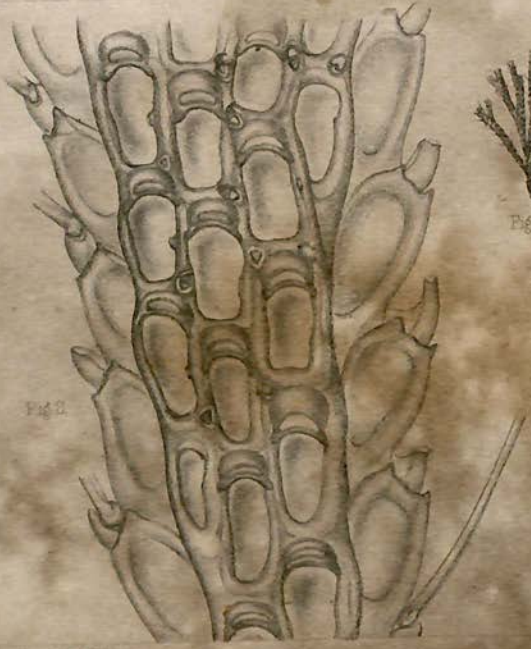

Fig. 2.

Fig. 1.

Fig. 3.

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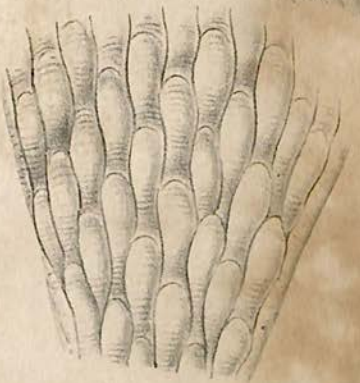
Pl XLVIII.

Fig 1.

Fig 2.

Fig 3.



LIBRARY
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ASIATIC

Fig

Fig 4.

Fig 5.

Fig 7.

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OF THE
ROYAL ASIATIC SOCIETY



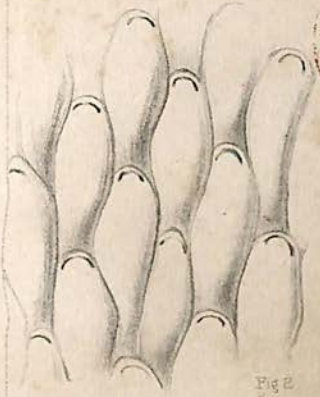


Fig 2

Fig 3

Fig 1

Fig 7

Fig 4

Fig 6

Fig 5

Pl L

Fig 1.

Fig 2.

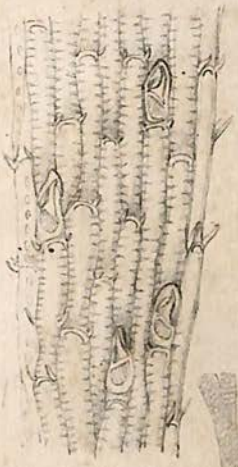


Fig 4

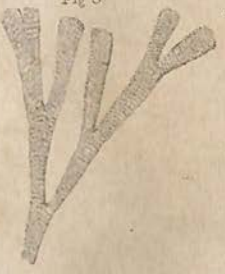


Fig 3.

Fig 5.

Fig 7

Fig 6.

Fig. 1.

LIBRARY
ROYAL ASIATIC SOCIETY

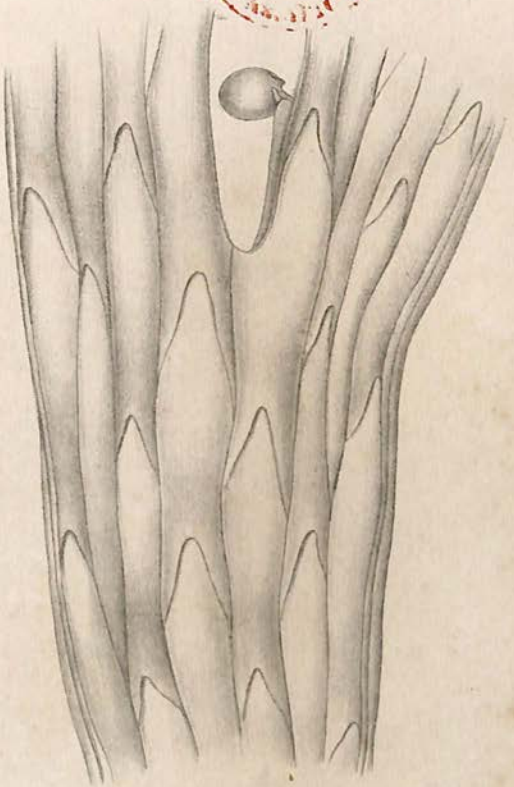
Fig. 3.

Fig. 2.

Acamarchis flabellata.
(front.)



G. Busk del. Achilles, lith.



Acamarchus flabellata.
(back)

G.B.T. inch.

G. Black del. Achilles Ink.

Fig. 1.

LIBRARY OF THE ROYAL ASIATIC SOCIETY

Fig. 2.

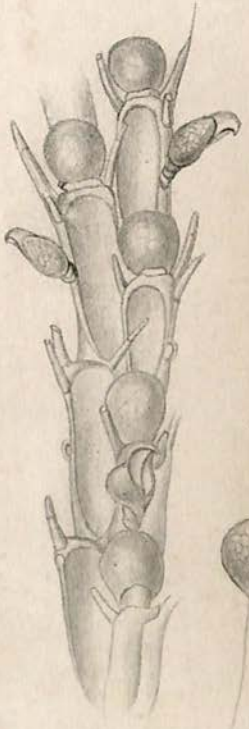


Fig. 3.

Fig. 4.

Acamarchis avicularia.

0. 0. 1 inch.

G. Busk, del. - Achilles, lith.

Pl. LIV.

Fig. 1.

Fig. 2.

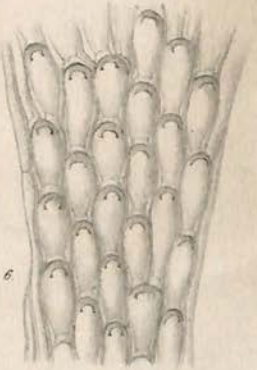
Fig. 3.

Fig. 4.

Fig. 5.

Acamarchis plumosa.

ROYAL ASIATIC SOCIETY — LIBRARY OF THE BOMBAY BRANCH OF THE



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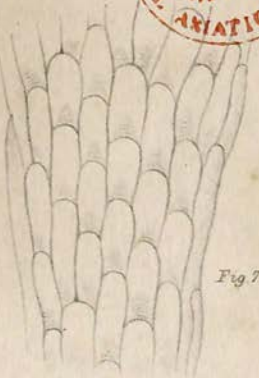


Fig. 7.

0.0.1 inch.

G. Busk, del. Achilles, lith.

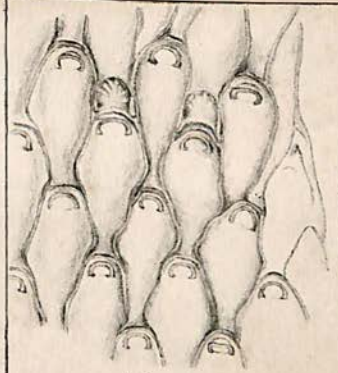
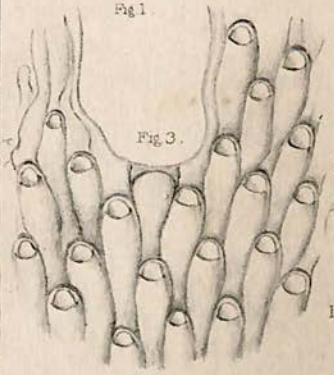


Fig 1.

Fig 2.



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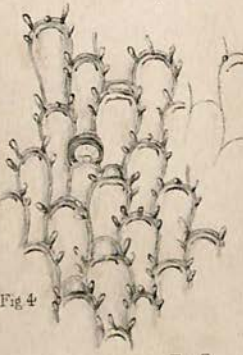


Fig 4.

Fig 5.

Fig 6

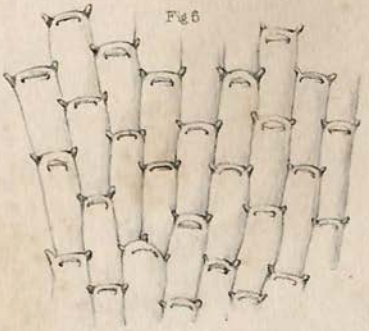


Fig 7

G Buck, del et Lith.

Ford & George, Lithographers Hatton Garden.

LIBRARY
OF THE
BOMBAY
BRANCH
OF THE
ROYAL ASIATIC SOCIETY

Pl. LVI

Fig 1

Fig 2

Fig 3

Fig 4.

LIBRARY
OF THE
ROYAL
HARVARD
OF THE
ASIATIC SOCIETY

Fig 5

Fig 6

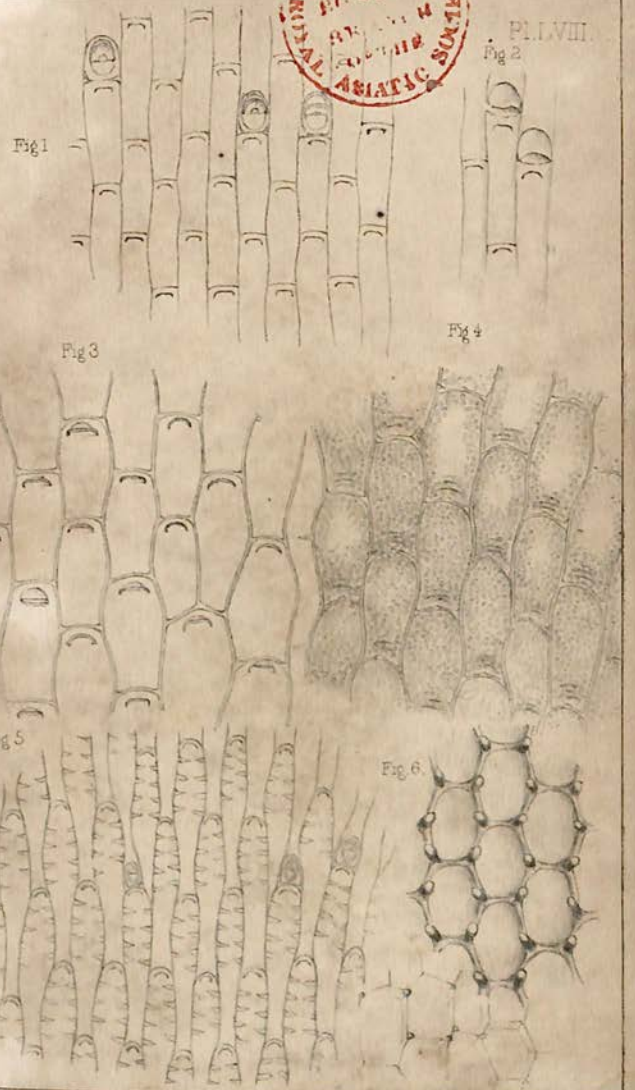
Fig 7

J. Bush. ad et Lith.

Ford & Swaine, Lithographers, Hatton Garden.

ASIATIC SOCIETY

Pl. LVIII.




G. Bush del et Lith.

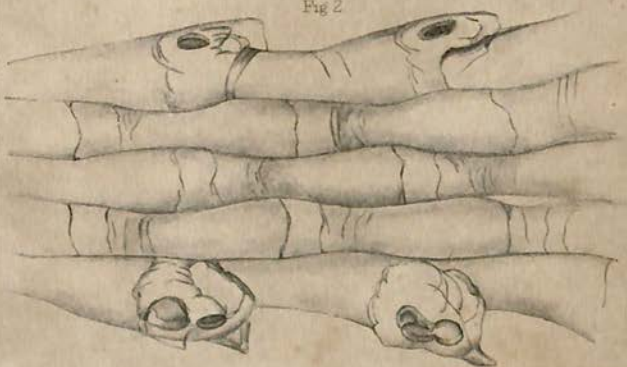
Read & Co's Lithographers Hatton Garden

Fig 1

Pl LIX

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY

Fig 2



G. Brook, del. et lith.

Ford & West, Imp.

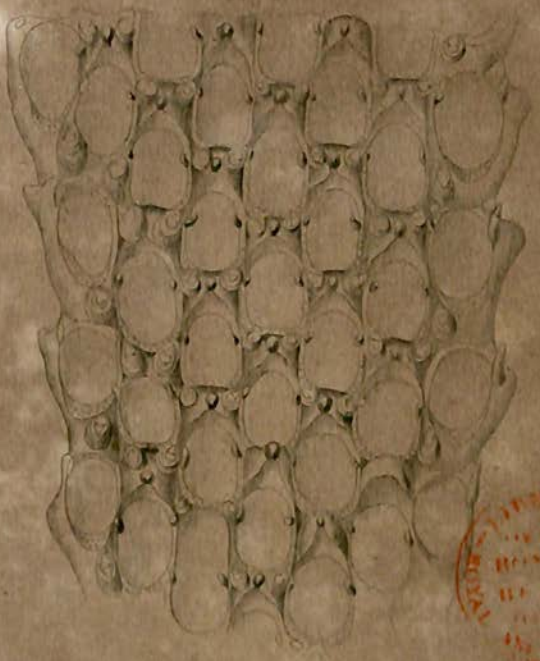


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Scrupocellaria scruposa.

Pl. LXIII

Fig. 1

Fig. 2

Fig. 3

Fig. 5

Fig. 4

Pl.LXIV

Fig 1

Fig 2

Fig 3

LIBRARY

Fig 4

Fig 5

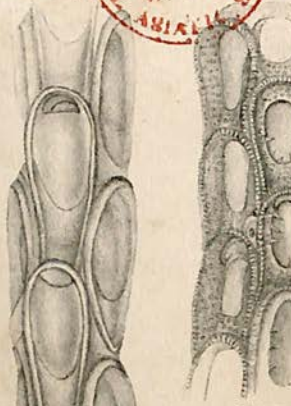


Fig. 2.

Fig. 3.



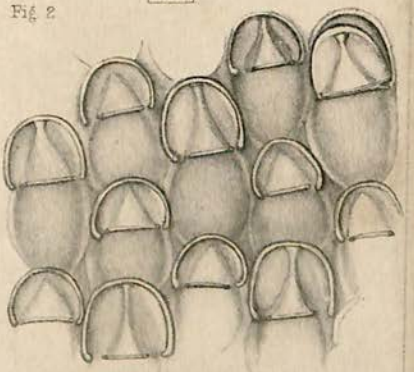


Fig. 4.

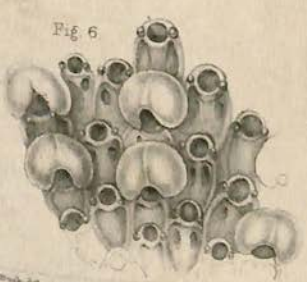


Fig. 6.

Fig. 5.

Fig 1.

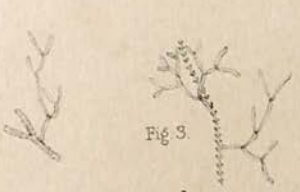
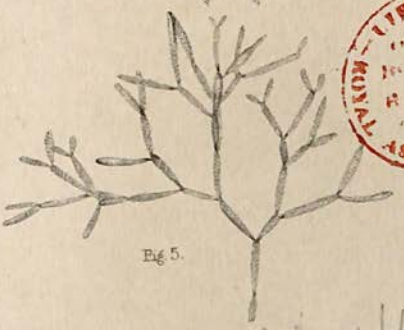


Fig 2.

Fig 3.

Fig 4.

LIBRARY OF THE ROYAL ASIATIC SOCIETY



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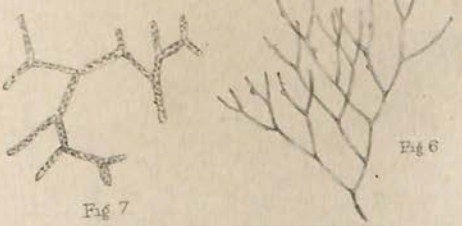

Fig 6

Fig 7

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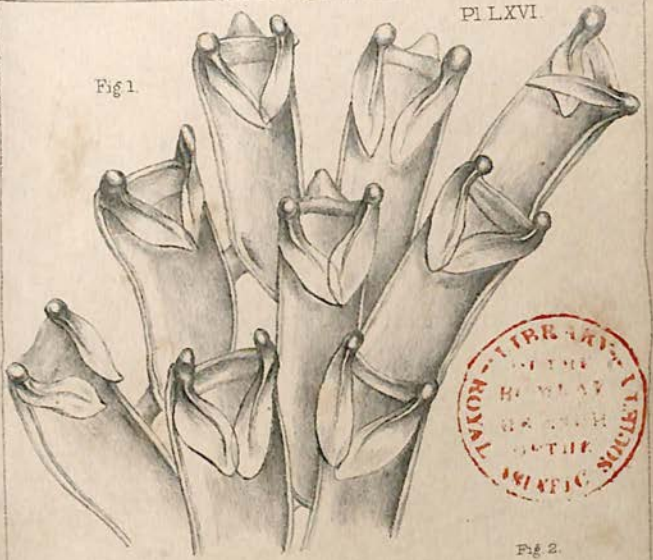
Plant & West. Imp.

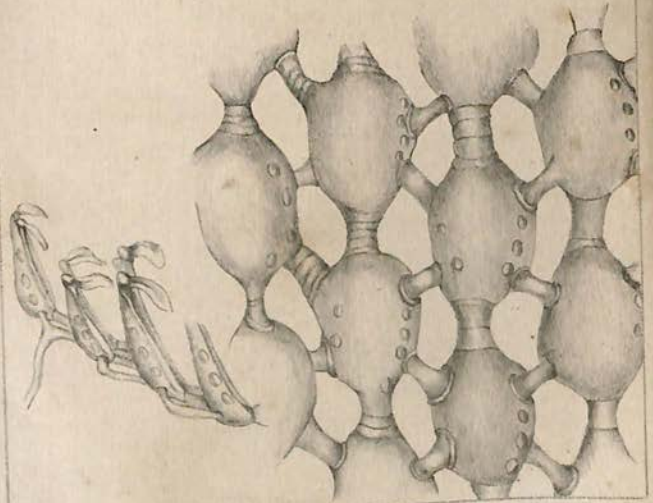
Pl LXVI.

Fig 1.



LIBRARY
OF THE
ROYAL
SOCIETY

Fig 2.

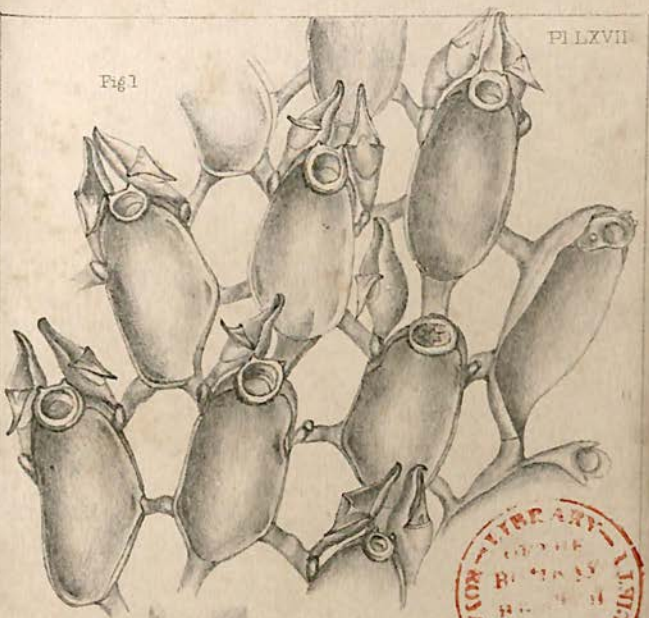


G. Brookshaw del. et lith.

Basil & West. Imp. 54 Hatton Garden.

Pl LXVII

Fig 1



ROYAL SOCIETY LIBRARY

Fig 2

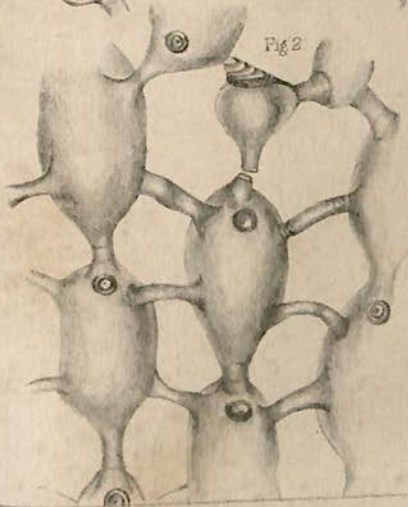


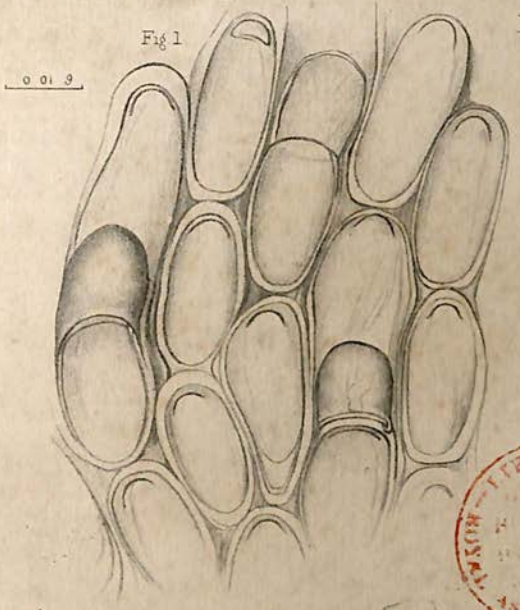
Fig 3

G Busk, del. et lith.

Pond & West, Imp.

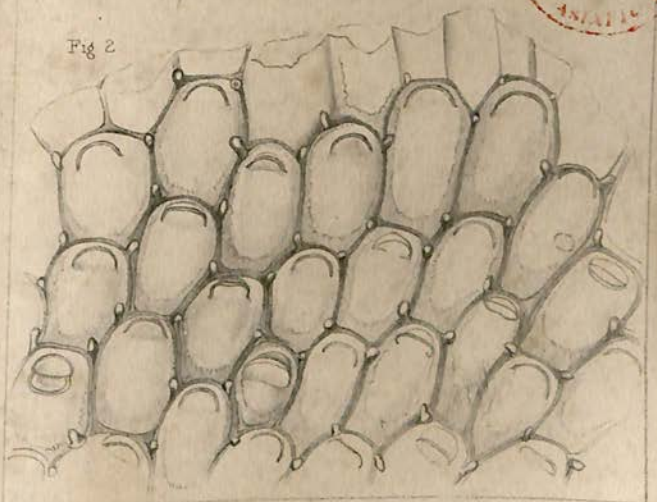
Pl. LXVIII

Fig 1



ROYAL ASIATIC SOCIETY LIBRARY

Fig 2



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Ford & West, lith. 54, Hatton Garden.

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